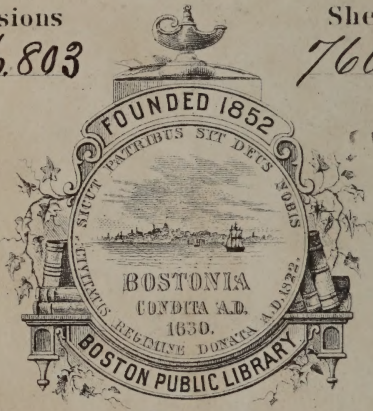
BOSTON PUBLIC LIBRARY
3 9999 08656 266 5

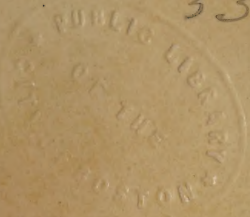
Accessions
226.803

Shelf No.
760.a.51

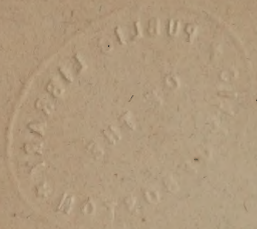


Gift of the
Mercantile Library Association
May 1877

XH8K
334



Mercantile
Library
Association



748
334

MAN,

IN

HIS PHYSICAL STRUCTURE AND ADAPTATIONS.

By ROBERT MUDIE,

AUTHOR OF 'THE HEAVENS,' 'THE FOUR SEASONS,'
'THE BRITISH NATURALIST,' ETC. ETC.

BOSTON.

OTIS, BROADERS, AND COMPANY.

MDCCCXXXVIII.

MERCANTILE LIBRARY, BOSTON

226.803
Harvard Div. Lib'y
July 12/77

BOSTON,
PRINTED BY FREEMAN AND BOLLES.
Washington Street.

PREFACE.

THERE is a beautiful allegory in the Book of Job, which, like every allegory in the Sacred Volume, is applicable to all conditions of men, and all pursuits in which they can engage. Job is afflicted; and, being in ignorance of the cause, he laments, and labors to discover it. His three wise and learned friends come to comfort him by pointing out the justice of his affliction, and they lecture him on the stubbornness of his ignorance; but Job rejects their schooling with all the boldness of a man conscious of his own integrity, and appeals from them to the judgment of his Maker. Then Elihu, the son of Barachel the Buzite, a young man who lays no claim to wisdom, comes forward to plead with Job, "in God's stead," as Job himself had wished—that is, in the simple voice of nature. He argues from the government of creation, and of Man as a portion of this creation; and shows that the real condition of Man can be known only from the study of the power, the wisdom, and the goodness of God, as displayed in the phenomena of nature; that every hypothesis resting upon a foundation different from this is vain and void; and he closes his oration with these remarkable words:—"Men do therefore fear him: he respecteth not any that are wise in heart;"—that is, any who pretend to have wisdom, or

knowledge, *of themselves*, in addition to that which they derive from observation and experience. Then comes the climax of the allegory:—The Lord answers Job "out of the whirlwind"—*διὰ λαλαίπος καὶ νεφῶν*—out of the turmoil of the clouds. Wisdom from on high breaks through the doubt and difficulty of the troubled mind; and the voice of this wisdom is still the voice of nature, though, being in the first person, and rising in expression with the speaker, it is far more striking than the preliminary or preparatory discourse of the son of Barachel.

Men in all ages have their afflictions as well as the Patriarch, or if they have them not, they make them; and, like the Patriarch, they long for wisdom, whereby they may find the means of relief.

On no subject is this longing more hard to be gratified than on the subject of ourselves—our real place and purpose in the world, and the final destiny of our being. If, when the whole of wild nature around us is in a state of perpetual enjoyment, and we are in constant toil and activity, our final destiny be to feed the larvæ of blind beetles, the little finger of our affliction is tenfold thicker than the loins of that which fell upon Job: his burden was a mote—ours is a millstone.

Then, the men who have taken upon themselves the office of assisting us in this matter—though, like Job's three friends, they have been men of much wisdom—yet, in general, they have come under the denomination of "the wise in heart,"—that is, they have formed their assertions on their own theories or hypotheses, and not on that which exists, and can be observed or fairly inferred from actual observation. Hence, they reprove, but they do not reform; they lecture, but they do not instruct.

Accordingly, the subject which it should interest us the most to know, is the one of which we are most ignorant,

and to the study of which we have the greatest and most general aversion. There is a fear to approach it, something analogous to the fear which children have to go into the dark—not because they know that there is any specific cause of alarm, but from dread that there *may* be such a cause. They who bring us into this state, or who leave us in it, however vain they may be, are but Job's comforters to us. They only add the burden of their own tediousness to that which was grievous before; and we shrink from them as Job did from his friends, and we fall back upon our own thoughts with more bitterness of spirit than ever.

I have seen this in the cases of many, and I have felt it in my own; and therefore, after much reflection on the subject, I am anxious, though of course in a very humble way, to perform the part of Elihu. I profess not to teach: I can only point out to others the way in which I flatter myself that I have obtained instruction—ay, and some portion of that moral confidence which poises a man erect in his position, let the wind of the world blow as it lists. We must not trust to human theories, let them be backed by what authority of name they may. We must read THE BOOK—that volume which is never closed, and the characters whereof are traced by the creative finger. We must study Man as he actually is, in his structure and in his conduct, from the hour of his birth to the final expiration of his breath; and this we must do—from a knowledge of the other creatures, and a full and fair comparison with them—whether he is as perfectly, fully, and exclusively of and for the present world as they are, or whether there is not in him an adaptation for which the present world has no counterpart—a desire which it cannot gratify; and upon the result of this, and upon no other sure foundation, we must build our hopes. If we do not this, our words and our worshippings are empty words and useless observan-

ces; and we are like a thistle-down in the pathless desert, at the mercy of every wind. If we do not, by some such process as this, establish the Man in one firm and demonstrative belief, then are we at the mercy of the animal—the mere slaves of animal passion; and, if such is the case, it matters not much whether the outgoing of the passion be in cupidity or in cant, if these *really are* different; for if the one invades the possession, the other is as prone to mangle the reputation.

On such a subject, it is necessary to write with a caution bordering upon tameness, more especially at the beginning; for, upon the same principle as the more feeble of the canine breed are always the foremost to give tongue, they who understand the least of the nature and destiny of man are ever the most forward, if any one shall venture to assail those dogmas the foundation of which they have never examined. There is another reason: as in mechanics, so in mental inquiries, a wedge is always the more powerful and the more easily driven, the nearer that it approaches to a simple plane.

For these, and for other reasons, some of which must occur to every intelligent reader, I have made this volume as unassuming, and as free from theoretic formality, as I possibly could; and I flatter myself that it will be intelligible to the most humble capacity, but at the same time not unworthy of the better-informed.

The argument for which I have endeavored to prepare the way, is, that the human body is organized and adapted for purposes which cannot have their complete fulfilment in the present life. This will lead to the consideration of Intellectual Man in a second volume; and, as the doctrine of Intellect, and its necessary consequence, Immortality, are the foundation of morality in the individual, and of good order in society, two more volumes will be

required to complete the whole subject, though each of the four will, by the avoiding of the formality of system, be an entire book without the others. They are my favorites above all others that I have written; and whatever may be said of the execution, the subject deserves attention from the public.

ROBERT MUDIE.

June 13, 1838.

ANALYSIS OF THE CONTENTS.

CHAPTER I.

PRELIMINARY REMARKS.

Self-knowledge peculiar to Man—Objections to books of mere anatomy, as affording the knowledge required—Objections to the writings of Paley—Difficulties in the study of Man—The secret character—Why all men are not great—Why some are great—The use of ourselves the grand point to be known—The human body and machines—What respecting Man is most important to be known—Division of the subject . . . page 1

CHAPTER II.

IMPORTANCE OF SELF-KNOWLEDGE.

That "knowledge is power," is not universally true—Power is not material, or a property of matter—Popular notion of power—Simple knowledge is not power—Obstacles to knowledge—Value of negative knowledge—To whom knowledge is and is not power—Education of the body—Education by experience—Examples—The theorist and the boat—Case of a peer—Regularity of thought and action—Ant—The hand—Mind—Its neglect—Degradation—Means of greatness . . 33

CHAPTER III.

MAN ALONE CAN ACQUIRE KNOWLEDGE.

Definition of knowledge—Knowledge of language—Pleasures of memory—Memory is *mind*—Systematic zoölogists—Cuvier's mistake—Sensation is not knowledge—Man and animals—Vital functions—Our ignorance of the system—Organs and functions—Dreams of phrenologists—The human *body* cannot acquire knowledge—Animal faculties—Vegetables and their adaptations—Forms of matter—Animal sagacity p. 69

CHAPTER IV.

MAN CAN HAVE NO KNOWLEDGE BUT WHAT HE ACQUIRES.

Man's original endowment—Innate ideas absurd—Instinctive perfection of young animals—Original genius a fancy—Body and mind—Derangement of the body—Original differences of infants are wholly physical—Knowledge has physical sources—Abomination of cant—We can address the body only—Effective means of addressing it—Beginning of knowledge—Identity is the foundation of knowledge and of action—Will—Delay—Physical training. 106

CHAPTER V.

PLACE AND PURPOSE OF MAN.

Value of a hint—Of self-teaching—The organization of Man—Advantages of *studying* the animals—Illustrations—Adaptation of animals to their places—Our proper school—The house-fly and the householder—Adaptation of fishes—Of birds—Organs and organization—Breathing—The first breath—Motion—Repose—Importance of fossil bones—Wings, and their characters—Feet of mammalia—Clavicles—Limbs for motion—Complex limbs—Carnivera, and their uses—Legs of bears—Structure of a paw—Handed animals—Prehensile tails—Perfect adaptation of animals to localities—Man an exception 146

CHAPTER VI.

SENSATION AND THE SENSES.

The first man—Must have educated himself—Notion of mind—Popular errors about feeling—No feeling in vital parts—Case recorded by Harvey—Proper sensibility of the heart—Sensations of nerves—Sensibility of the eyes—Vision in animals—Sensations of the ear—Man alone has sensations of perception—Instincts of safety perfect in animals, very limited in Man—Membranes only are sentient—Nature of the muscular sense—Feeling of the centre of gravity—Muscular sense our first tutor—Man as a mere animal—Utter fatuity—Wretchedness of Man as an animal . . page 198

CHAPTER VII.

SENSATION—PARTICULARS OF SOME OF THE SENSES, AND THEIR CONNEXION.

Doctrine of developements—Making of a planetary System—Developement of matter into Man—Action not material or organic—General adaptation of Man—Structure and functions of the eye—Pressure on the eye—Vision not mechanical—Retina—Field of view—Axis of vision—Oblique and complex lights—Range of the eye—The inferior senses—Sensation of the ear—Obscurity of the process of sensation—Sympathy of the ear and voice—Popular orators—Language is intellectual—Conclusion 247

PUBLIC LIBRARY OF THE CITY OF BOSTON

MAN,

IN HIS PHYSICAL STRUCTURE AND ADAPTATIONS.

CHAPTER I.

PRELIMINARY REMARKS.

"KNOW THYSELF," is the solemn admonition of the great Athenian Lawgiver, in consequence of which he is placed foremost in the list of the Seven Sages of Ancient Greece; and the admonition has been repeated by high authorities, both in ordinary philosophy and in the Sacred Volume: and it is not a little remarkable that Linnæus, whose short hints often embody more matter than the lengthened disquisitions of more wordy philosophers, has made the power of obeying this mandate the only characteristic of man, in his "System of Nature," or grand classification of the living and growing inhabitants of the earth. After the mere mention of the name, all that the great Swedish naturalist adds, to distinguish man from the other animated beings, are the two short and simple words, "knowing himself,"—that is, that man can obey the injunction of Solon, if he will; and though Linnæus had exhausted the whole of that eloquence which,

when the occasion required it, he could exert so warmly and so well, he would have added nothing to the force and the fulness of that very brief expression.

Considering the high authorities by whom the command has been given, and the power of complying with it expressed so strongly as being the distinguishing character of Man as a physical being, it is somewhat remarkable that we have had no book for popular reading, in which even the outlines of the whole subject are treated in such a manner as to be efficient for practical purposes.

We have no lack of books, and very many of them excellent books, upon the anatomy and physiology of the human body in the aggregate, and upon the structures and functions of all its several parts, systems, and organs. But these books are, for the most part, of a medical and surgical nature, relating to the structure of the body or that action of its parts which has little to do with giving man more efficient use of it in its healthy states—as they describe it wholly or chiefly in its mechanical arrangement, and its chemical composition, with very little reference to the place which it holds, and the part which it is required to act, in the system of created nature. Besides, there are some obstacles and objections to these books as part of the every-day reading of the great body of the people. In the first place, they are too expensive; in the second place, they are unpleasant books to look at; in the third place, many parts of them, however necessary and valuable they may be for medical men, are unfit for general circulation and perusal; and, in

the fourth place, not any, or even all of them collectively communicate, or are intended to communicate, that popular knowledge of the body which is implied in the injunction which has been quoted.

The dissection of a human body is an operation repulsive to our natural feelings, for what purpose soever it may be performed; and, though one can easily understand that a man who is intent upon finding out the best means of reducing fractures, amputating limbs, and saving lives, may dissect a human body with as mush scientific zeal and honesty of intention as a chemist analyses a substance, or a mathematician solves a problem; yet we greatly doubt whether an idle spectator, who had no scientific purpose in view, —no prospect of bettering mankind by the result of all that cutting and mangling of which he was a voluntary witness, could escape with equal purity of feeling. That professional men, who attend to such matters, and who must attend to them, or otherwise be but a lame hand in the operative proceedings, and who do so from the desire of doing good, or more frequently perhaps from that of attaining to eminence in their profession—which is scarcely less praiseworthy than the other, are not affected by those repulsive sights, is proved by the fact that medical men, taken as a class, are among the most suave in their manners and kindly in their dispositions, as well as among the most intelligent, in the whole community.

But still, that does not make mangled bodies, and severed limbs, and heads sawn asunder, and the processes of the most painful operations, and the aspects of

the most loathsome diseases, either in the human subject itself or in pictorial representations, more fit for the public eye, or for being the graphic attractions of books from which the younger branches of families are to glean their information. The chief objection to Paley's Natural Theology, or at all events the objection which comes second to the absence of those intellectual and adaptorial views, on the large scale, which ought to take the lead in every such work, is, that it is of too anatomical a character, and represents Man more as a piece of ingenious mechanism, than as a being possessing life, endowed with an immortal spirit, organised in subservience to that spirit, capable of doing much good and arriving at much eminence, and confident in the full assurance of eternal mental enjoyment when the sun of this world has, to him, set for ever.

We admire the mechanism,—as who that runs the parallel with the works of man can fail to admire it; but truly this is a humble tribute of admiring adoration to Him, who spake, and those bones were instantly perfect in all their parts, clothed with all their integuments, and the whole in healthy and vigorous action. That "breath of life," which, as is revealed to us, "the Lord God breathed into the nostrils of man," and of no other sublunary creature, must, even as it is displayed through the medium of the body, always be both the highest and most delightful part of the study of human nature, and the most striking illustration of the power, wisdom, and goodness of the Creator, that can be drawn from his works.

If we are endowed with the proper spirit, that which we first and chiefly desire to promote and participate in, must be what has brought the naked, houseless, and ignorant savage out of his cave, clothed him in purple and fine linen, set him upon the throne of the earth, and given understanding to his mind and dexterity to his hand, till every land has been traversed by his foot, the waters of every ocean have been divided by his keel, and the glance of his eye has carried the line and the balance full eighteen hundred millions of miles into the depths of space, to fetch thence intelligence of a world more magnificent than ours, and the which world, distant as it is, is only as the threshold of that mighty temple which God in his goodness has been pleased to permit us to contemplate.

The grand knowledge of Man, viewed as a subject of general study, is that of the means and the mode by which the race have come to that state in which we find them; and how their career may be continued at an accelerated rate: and, when we bring this home to ourselves as a personal matter, it is reduced in extent and shortened in time, but in its essential nature it is still the same,—by what means have we been brought to our present state? and how shall we improve that state, and become wiser and happier every day?

Now, mere definition, demonstration, and description of organization, how useful soever they may be for their own peculiar purposes, are of comparatively little use to us in this grand inquiry; and if we allow ourselves to be diverted from it by them, we resemble

travellers who loiter by the way-side in culling wild flowers and gathering pebbles, which amuse the fancy but retard the journey. If we open the tumuli upon a battle-field, in which leader and led have been hastily entombed together in one promiscuous heap, it is in vain that we attempt to distinguish the bones of the commander from those of the humblest individual that he led on to the carnage, or take up the bone of one arm and say, "this wielded the weapon of a hero," and another and respond, "this fell powerless by the side of a coward." The dead have no tale to tell, even from the instant that the breath is extinct, and before the expression of the last pang, and the quivering of the parting struggle, have subsided into the stillness of that clay-cold image which sorrowing friends consign to its parent earth, sometimes with pomp and ceremony, which bitterly mock that mortality which they are intended to honor, but cannot.

If we would know more of the man, we must seek for it among the living, not among the dead; and whether sepulchral marble, formed with the most exquisite art, and all but breathing into life, or the oozy deeps of the ocean, shall cover his mortal remains, his real monument is taken up in the current of human improvement in the exact ratio of the real good that he contributed to produce, whether the crowd of his day sounded the trumpet of fame before him, or yelled in detraction at his heels, or did sometimes the one and sometimes the other.

The man respecting whom we seek that general knowledge which is to be really useful to us as mem-

bers of society, is not the man of the anatomist, for he is a mere body, and the study of him is but the study of matter, and not even of living matter. As little is it the man of the systematic zoölogist, for while the former is body without life, this one is the living animal without mind. Nor will the man which the intellectual philosopher labors to set before us answer our purpose better. He has something that the others want, but he also wants something which they have. Nay, even if we could combine and generalize all the three, our result would be all too narrow for what the case demands. In this public and general knowledge of Man, we wish to include the originating impulse, and the means of all that has been known, and all that has been done, because without this we may, in our efforts at improvement, omit the very circumstance which would give that improvement effect and value. The attainment of this, or any thing like this, is impossible; but still we may have our faces directed to it, and thereby advance a little way.

In our own individual case—intimately as we may suppose ourselves acquainted with that, we have difficulties of a similar kind; only the magnitude of them is reduced to very little in comparison—to one individual as compared with the whole race, and to a portion of a single life as compared with the whole period of human history. In respect to their historic periods, short as the one is in comparison with the other, the history of the individual has a remarkable coincidence with the history of the race. We cannot trace the origin of language or the first dawnings of

knowledge, either in the pages of the record of antiquity or in the accounts given by voyagers, since navigation has discovered and explored those places of the earth which seas, deserts, or impassable ridges of mountains, had, up to the time of their modern discovery, cut off from any participation in that knowledge and civilisation to which our own history belongs. The beginnings among many of them were rude; but in every one there was a beginning, and a beginning of the origin of which they themselves could give no account. There was always a language, and the use of fire, and weapons of some sort or other, both for the capture of fish and other animals for food, and for combats between tribe and tribe. It is worthy of remark, too, that among these rude nations, improvement appeared most completely at a stand where it seemed to have made the least advance in former time—to be, so to speak, nearest to its first or rudimental state. Thus, infant civilisation is no evidence of a young nation, but rather the reverse. The young races, in all countries where a remnant of an earlier population remains unmixed, are always the more advanced in knowledge and civilisation. In the Oriental isles, the blacks, who still are found in many of the central forests, are certainly an older people there than the Malays of the coasts, but they are not so civilised; and they display far less intellect. It is the same in those parts of the Eastern continent in which a remnant of an earlier population is to be found in the fastnesses of the mountains or other situations, which the immigrants have not felt disposed to pay the price of

occupying. In America it is still the same; and, independently of the inferiority of the natives generally to the European settlers and their dependants, wherever a travelled native population have come, they are always, in some degree, superior to the race which they have displaced. We can readily understand why, at the time of the arrival of the new inhabitants, they should have been superior to the old; for if they had not, they would have been the conquered and not the conquerors. Thus, it seems to be a general law of human society, that the people who are the oldest, that is, who have been the longest in any locality, are ever the lowest in the scale of civilisation.

The subversion of the Roman empire by the people of the North, the barbarians, as they are called, is a nominal exception to this, but not a real one. They were called "barbarians," that is, "bearded men," and acts of cruelty perpetrated by them are recorded, probably with many exaggerations: but if we could get at the real facts, there, seems little reason to doubt that we should find ample proofs of their being far superior in intellectual energy, as well as in bodily vigor and endurance, and in all the higher attributes of the human character, how much soever these may have been dashed and debased by rudeness, to the degenerated and effeminate Romans. In our own country, there is no question that the Saxons were superior in intellectual energy to the Britons whom they dispossessed; that the Catti, and other continental tribes that took possession of the eastern

coasts and eastern islands of Scotland, were superior to the native Celts that gave way before them; and that the Norwegian adventurers, who became the chiefs of the clans in the West Highlands and isles, and gave their names to the clans, were superior to the natives over whom they gained such an ascendancy.

Thus, turn where we may upon the globe, we cannot reach so far back as the time of the invention of language, or the first introduction of those arts which distinguish men, even in their lowest states, from the other living creatures. In our individual case it is much the same. We cannot carry our memory back to the time when we learned to speak, or detail the means by which we acquired the use of that grand means for the communicating and perpetuation of knowledge. Much less can we tell when we first began to feel and to think; and therefore, our intellectual origin, like that of nations, and of the whole race, is involved in obscurity. This is another difficulty in the way of our knowledge of Man, whether we take that knowledge as general, or as particular, and applicable to our own case.

There is another circumstance connected with our individual knowledge of ourselves, which must not be lost sight of. The individual that we must know, is not the same that is known to the public generally, in the case of our being so known at all, or even to our familiar friends. What we appear, in the former of those cases, is in a great measure put on, whether we are aware that it is so or not; and, even in the latter,

there is a dark closet in the character into which our most intimate and endeared friend is never permitted to look. It may be well, certainly it is well, that such is the case; for if our minds were denuded of all covering of prudence, "the shame of our nakedness" would morally appear as offensive to the world around us, and as injurious to ourselves, as would be the case if we went about physically denuded of our garments. This is not hypocrisy; but may be, and often is, an opposite, and, consequently, an estimable feeling. We have really no control over the trains of our thought. We cannot will them, for the one succeeds the other in a manner over which we have no control; and if two subjects are communicated by the senses, or arise in the mind from suggestion, we can no more help feeling the relation that subsists between them than we can help feeling pain in our finger when it is stung by a hornet, or comes in contact with a live coal.

Therefore, our own happiness, and that of the portion of society with which we are acquainted, or in which we have any connexion or influence, both require that we should have a character peculiarly our own, which necessarily contains many traits not to be found in that in which we come before the public. This is our private or personal character, and has nothing to do with station or title, or any of those external attributes, clothed with which we come before the world, and by which we are known there. It has been said, and probably with truth, that "no man is a hero to his valet-de-chambre;" and it may be said

with still more truth and force, that "no hero is a hero to himself." The valet-de-chambre may see many unheroic traits in his master, which are little suspected by the many whom he defeats in the field, or even by the officers under his command, whom he is in the habit of meeting every day.

If our philosophers have due knowledge of this character, which it behoves every man to know for himself, and which none but himself can know or should know, then they are no philosophers in their own eyes; they are men who toil and vex themselves, are always in perplexity, and very often foiled or in error. They creep on "with difficulty and labor hard," and the little steps which they take, though micrometic steps in their elements, make some show before the world, and we wonder at their achievements simply because they are new to us. But they never master the grand discovery,—that which is to make them philosophers in their own estimation; or if they fancy that they do, then their discovery lies in the limbo of vanity, and they are not philosophers,—they are self-deceivers, men ignorant of themselves. If they have the requisite self-information, they have no sooner gained the summit of one elevation, than another more lofty rises up before them; and if they have the proper spirit in them, and man themselves for the toil, the view extends on and on, and they never gain the highest summit; for death comes in, and in tender mercy to a body which is worn out with the toil, lays it down to its repose in the dust, leaving the free spirit to bound onward with ceaseless and inexhaustible

vigor. But to us, in the present world, there is a thick veil over the course of that future progress, and a veil which our own death alone can get us within.

That the ultimate object of even the most active-minded of our race is never gained on this side the grave—and beyond this we know no particulars—is really one of the very best parts of the constitution of man; for it is this which impels us onward, will not allow us to stop, and thus has achieved for us and for our brethren all those improvements which we see around us, and which are augmenting every day: and it is just because weak and vain minds do not know themselves in their real characters, but take up the echo of the public applause, or sometimes their own vain self-gratulation without any public encouragement, that they fancy they have "done their do," and cumber the earth, boasting, but useless, for the remainder of their lives. It is this also which in all cases should, and in the case of those who know themselves will, make us welcome death as a helper and deliverer, whose friendly hand will enable us to accomplish that, for which, encumbered as we feel ourselves to be, we are all unfit. Subject to that deterioration and decay to which all material things, in all their states and modifications, are ultimately subject, the body has ceased to be able to bring information, or to answer the call of the mind, and perform the necessary labor. The consequence is, that it degrades us. Beauty is darkness to the eye, music is dumb to the ear, the sweets of the grove give forth no perfume, the breath of spring wafts no

renovation; we rock and totter like a time-worn ruin, we prate like children, and those whom our care reared into life, and our counsel led in the way of knowledge, have nothing to spare us but their pity. Who would wish to remain in such a state, even if the pit of annihilation were yawning wide before him? Who, that had the full assurance of joy in a world where disease and decay shall never come, but where the never-failing To-morrow shall always be brighter than the radiant To-day, would not have "a longing after immortality," an exultation in the near prospect of deliverance?

If that knowledge of ourselves which every man ought to have, and which every wise man actually possesses, led to no other result than this, it would, and as far as we are personally concerned will, repay manifold the little labor which the acquiring of it costs us. But this would be selfish, and unworthy of the proper dignity of the human character. We are not sent into this world for the mere purpose of dying, even in the fullest assurance of endless happiness. So curious a structure as the human body,—a structure the proper adaptations of which are for the performance of something which is not immediately produced by nature; but which requires that we should do as well as know, as long and as diligently as the body is capable of doing,—a body thus adapted, is diverted from its proper use, and the goodness of the Creator is despised and his law contemned, if we do not find out what its capabilities are, improve them to the highest degree of which they are susceptible,

and exercise them with that vigor and activity which shall give evidence that we are grateful, not only for the original gift, but for having had our lot cast in a land so redolent of the means of instruction and occupation. Our obligation upon the latter account is far greater than we are apt to suppose; and the very circumstance of our being born in a land of light and of liberty, in which we have every facility for knowing, and every scope for acting, imposes upon us a duty to our country which we cannot fully discharge, even in the course of the longest and the most active life. We speak of certain great men,—of our Watts, our Arkwrights, and many others, as the benefactors of their country; and we willingly allow that this praise should be given, both in justice to these great men, and for the encouragement of others. But had Watt and Arkwright no benefactors to whom they were bound in gratitude? Did they not learn our language, read our books, gain instruction from our conversation, and obtain all the materials of their art,—ay, and all the hints of their science and their schemes, from our storehouse?

Far be it from the present intention to detract one jot from the merit which is due to such men; they tried, and they succeeded nobly, and the highest name and honor which can be bestowed upon man are due to them. But still, they were mere men; and though the popular phrase runs somewhat differently, not one or all of them did or could *invent* the simplest original idea. They "knew themselves," had ascertained what their powers were, and how to turn those powers

to account; and, knowing this, they could borrow hints from all things and occurrences around, and build up these hints into those most splendid and useful combinations, which stand monumental of the greatness and value of their self-knowledge.

And why are we not all equally eminent with them, in the several places which we occupy in society? Very many of us have as favorable opportunities as any of these great men, and not a few have better. Some of the most illustrious ornaments of our country lived in ages when there were not so many means and stimulus for improvement in all England, as there are now in some single counties; and that the improvement of those means do not tell so conspicuously in this single instance is, probably, in a great measure owing to the instances being far more numerous. But whether this is wholly the case or no, we have certainly more subjects, opportunities, and advantages than they had, and we have the same powers for turning them to account, if we would only study and know ourselves rightly.

We must not drug our understandings with so stupefying an opiate, as that such men had *genius* and we have none. This is the subterfuge with which the negligent and the idle try to appease those twinges of conscience which, if properly and promptly attended to, would lead to the happiest results. But the majority of us do not find out this truth till it is all too late,—till society has decided the amount of our value, and decay has marked us with its broad arrow; and then we make ourselves outwardly ridiculous by

our fruitless lamentations, or have our hearts gnawed and corroded to the core by their concealment.

Our own experience never furnishes us with sufficient data upon this important subject, until the time has gone by in which this data could be turned to the proper account; for if we knew ourselves only by the results of our own experience, we should be as self-ignorant as we should be of nature around us, if we knew nothing more of it than we had actually observed by the use of our own senses.

Observation of the world, that is, of society around us, may seem to many to be exactly what will meet the case, and supply that which we cannot obtain from our own observation and experience until it is too late. But we labor under disadvantages in this case also,—disadvantages which are widely different from those which meet us in our own personal experience, though certainly not less numerous.

The world is a school of experience, in which way soever we regard it; and though the experiences that we observe in others, are many to one in comparison with what we feel in our own individual case, they are by no means so intimately known or instructive. They also require a length of time, and time is wasted and attention distracted in the observation of them; so that we cannot get what we require either from our personal experience, or from what we observe in others.

Even in operations which are merely mechanical, we learn very slowly by merely looking at others. One who could not write might stand six months

over the desk of a penman and see him writing all the time, and yet not be able to sign his name, or even form a single letter, at the conclusion. In other matters it is much the same; we may see the tool or the instrument, and the way that it is held, and the motions given to it; but there is a *can* in its application by a practised workman which we never see, and which the workman himself cannot communicate to us. We might run over the whole list of the arts, both useful and ornamental, and find the very same result in them all. Nothing seems so easy as the most nice and delicate operation when we see it performed by one who has acquired the art of doing it; but nothing is so difficult when we first try to put our hand to it.

But it may be said that all this is merely mechanical, and that it is different with the conduct of men, and with every thing depending upon thought. This is a mistake; for the very reverse is the case. Is a man's action or conduct in life, or his arrival by thought at the knowledge of a truth, or the plan of a work or an undertaking, an easier matter than the use of a saw or plane, the bow of a violin, or a painter's brush? He who imagines that it is, knows very little about the matter. In the case of the mechanical operation, we see the tool, and in part, at least, the manner of using it; but in the case of thinking and planning, we see neither; we only see the result; and all else that we can originally learn, must be gleaned from that.

In the knowledge of the conduct of mankind, we

have proof, even to a proverb, that little can be gleaned from simple observation; for they who make the conduct of others the chief object of their attention, and the chief subject of their thought and speech, are invariably triflers in mind and idlers in action. There is, in fact, more human time and talent—no, not talent, but what might be made talent, —wasted in this idle observation of mankind and occupation about their pursuits, than upon all other subjects of dissipation taken together. And a very little reflection may suffice to show us that such must be the case. We see that which tells us nothing more than we are told by every object and every event, whether in nature or in art, namely, that something has been made, or has happened. We see the effects produced on society, just as an ignorant man sees the progress of nature in the seasons, or the apparent motions of the sun, moon, and planets in the sky: but we do not see the causes; and if in this state of knowledge, or rather the want of knowledge, we make the attempt, we are very likely to apply wrong means or make a wrong application, and in either way failure is certain.

Mankind are thus masked to us, without the supposition of any desire on their part to put on disguises. But they do always put on such disguises, not necessarily with a view to mislead us or any body else, but because it is absolutely unavoidable. A man who runs about telling all the world of the splendid schemes which he has in petto or in progress, seldom brings any of those schemes to bear in an effective manner;

and even if he does, those who know him, and who would be the proper parties to set the scheme afloat with the public, are talked out of all knowledge, or at least all endurance of it, long before it can be brought to bear.

Thus a certain degree of masking before the world is absolutely necessary for the success of individuals, and consequently for the good of society; and this is the reason why, as we previously hinted, the characters which we see upon the public theatre are by no means those *selves*, of whom they have, or ought to have, intimate knowledge as individuals. In public they all have parts to play, and they rehearse and dress for their parts, not in the same manner indeed, but with very much the same assiduity, as the common actors of the fictitious drama; and, whether they will or no, mankind exhibit a tragedy, a comedy, or a farce, according to circumstances, to the enacting of which they are impelled by precisely the same motives as their brethren of the buskin—the hope of their pudding and their praise.

This is unavoidable; but even if it were not, the avoiding of it would not be endurable. Who could bear, for instance,—and we purposely take our instance from where high talent, spotless integrity, and devoted patriotism are by all admitted to shine more conspicuously than they elsewhere do throughout the land,—who could bear the cloakless carcase, or the skinless anatomy, of all the ways and wiles, all the plannings and packings, all the preachings and promisings, and all the cheapening of opinions and hux-

tering of souls, that must be put in large and earnest practice, both to support and to oppose a contested measure in our Houses of Parliament.

Such being the case in the most lofty places of the country, we cannot expect that it shall be better where all are more mixed, and many are more lowly,—where the chaff is not winnowed away by the gales of eloquence, and the grist is yet unbolted by even the electoral sieve; and, therefore, we may hold it as a settled point, that the public displays and aspects of men in society are not those from which we can glean that knowledge of human nature which is nevertheless so essential to our right understanding and guidance.

Even if we had not these more palpable demonstrations, we might arrive at the truth by merely attending to the ordinary phrases which we hear every day, and for which, among many other advantages, we cannot be too grateful to the original inventors of language, or to those who have licked and fashioned it to its present shape. There are very many occasions upon which we can use the word with composure, though to grapple with the real matter for which that word is set down would require twice considering.

To "know the world" means, by literal interpretation, to be able to escape its dupers, and practise upon its dupes; and "a man of the world" is understood to be one who is an adept in this art. Now, why should such names and such occupations be necessary and current; and why should the one and the other win from us, as they unquestionably do, a certain quality and measure of praise? Why, clearly for

this reason: the requisite degree of knowledge upon the subject for enabling us to accomplish our purposes by wisdom, does not exist in society, and therefore, we are constrained to use cunning for knowledge, and craft for wisdom. We have not learned enough to enable us to convince, and therefore we go about to cajol.

The science to which we allude, though the elements of it are scattered through numerous volumes, has not, so far as we know, been presented in a common form, or even obtained a name. THE USE OF OURSELVES is the real meaning of it; but that is too common-place for being received as a technical name. The name is, however, a matter of very inferior importance, so that we can obtain a little of the reality, and can make the knowledge of ourselves, in some sort, a branch of education. Whether it could be formally introduced into the routine of the schools is a point which cannot be decided, as there is no evidence upon it, the experiment never having been tried; and our school education all proceeds upon the assumption that the pupil has sufficient knowledge of himself, or if he has not, he is left to acquire it as he may, along with other things, or let it alone.

Now this is not our mode of procedure in the case of almost any thing else. If an artisan or operator of any kind is to make use of a complicated tool or instrument, some pains are taken to school him in the arrangement and use of the different parts, the way of applying the complex instrument, the imperfections to which the several parts are liable, the compensations to be used for the errors arising from them,

and the methods by which it may be kept in the best order, so as always to be ready for its work, and capable of performing this work well.

But all this is done without any lecture upon the anatomy of the instrument, or disquisition on the natural history or the chemical composition of the several parts of it. The whole of the tool or instrument in its working state is the principal subject of the explanation; and though the parts may be run over in their connexion, just for the purpose of pointing out their relations to each other as conducing to the general effect, yet we never think of taking it to pieces, except for the purpose of showing how it may be cleaned or repaired.

The human body is, in itself, a far more complicated instrument than any which has been constructed, or which can be constructed, by human skill; and the healthful performance of all its functions is absolutely necessary, in order that the body may rightly enact its part in the business or other occupation of life, whether for profit or for enjoyment. The steam-engine has often been alluded to as a master-piece of art, and there is no doubt that it has been, and is, and will continue to be, of great and increasing advantage. But after all, when we come to analyse any of the results which are accomplished by the application of steam, so as to get at the part which the engine actually does, we find that a great deal of complicated machinery is required for the performance of one of the simplest operations. The ultimate effect may be very rare and curious, and it is actually so, in very

many of the purposes to which the engine is applied—as in steam-printing, coining, mill-spinning, and many other matters. But it is not the steam-engine which does all or any of these: it is another engine, and very generally, mechanically speaking, a much more curious one than the steam-engine; for while this other machine could be made to perform its work without the engine, the engine could do no part of the work without the machine. The printing-machine, the knitting-frame, and many others, might be named as instances of this.

We are far from wishing to disparage the steam-engine; so far, that we at once admit that, as an application of scientific knowledge and mechanical skill jointly, it is the foremost that ever was introduced into the arts: but as occasion is often taken to run parallels between Man and machines, as these parallels are not always managed in the most judicious manner, and as we purpose to consider the more remarkable adaptations of the body of Man, which is the human machine, we have felt that the introduction of these remarks in this preliminary chapter might prevent mistakes, and also prevent us from requiring to break the succession of our observations afterwards.

In kind, the ultimate operation performed by the steam-engine itself is one which any child could perform; and the difference is merely one of quantity. Suppose a child takes a leaden bullet fastened to the end of a bit of string, and alternately raises and lowers its arm, or that it merely raises and lowers the arm without holding any bullet in the fingers by a string,

this is an operation of the very same nature as that which the engine performs. It is a small miniature, indeed, and the child could not continue it as the engine does; but then the child could make the bullet sway like a pendulum, or round in circles or any other curves; and this the original mover of no steam-engine could accomplish. The work of the engine consists in moving a piston alternately from end to end of a cylinder, with great force and regularity—only, the regularity must be obtained by means of other contrivances; for the engine, without its centrifugal governor to regulate the admission of the steam, and its fly-wheel to keep up the motion at the turn of the stroke, would be a most irregular and unsteady servant.

Thus, that which the steam-engine supplies, is the most rude and elementary of all working; and the very same result may be obtained from falling water or blowing wind, which were used for the same objects before the steam-engine was contrived; and falling water is still preferred to the engine in all situations where it can be obtained, because the use of it is very considerably cheaper. But, notwithstanding its greater cost, the engine possesses many advantages. It can be had in any situation where there is a little water; it occupies little space; it can be made of any power that may be wanted; and it works just as well sailing on the sea, or travelling along a road, as when it is in a fixed position upon the earth. These adaptations are more numerous than those of animals, at least, considering them as mere powers; for until we have

learned to rein in the whale and the dolphin, and make the shark and the skate our hunters upon the deep, the chance is that we shall never be able to employ any animal power in our sea service—except the powers of the sailor. Steam-engines cannot be substituted for animal power in all cases, even upon land. It is possible that in time they may be introduced upon the race course, and mechanics may run their engines, of the same computed power, against each other, in the same manner as sportsmen now run their horses: but we doubt whether the squires of any county in England will ever follow the hounds by steam; and *we* at least cannot see how the cleverest engine could be made to clear a fence or a five-barred gate. Condensation of power is the grand property of the engine, and in this it has certainly no rival, though it *may* have one some day.

We have dwelt at some length upon the subject of the steam-engine, because it is indirectly a part of our main subject—the capability of Man. The rest of nature produces no steam-engines or machines of any kind; and as our appeal, in showing the capacity of Man for any thing, will always be best made to that which is already done; and taking the steam-engine in all its applications, it is certainly one of the most remarkable instances of the success of human design and execution united, it is one of the best to which we can refer in the general way, though we shall afterwards have reason to allude to many other human contrivances and accomplishings of a more particular and limited nature.

In order that our knowledge of Man may be commensurate with those means of knowledge which are strictly human, we must limit our inquiry to that which Man has actually acquired for himself, as the proof of his own endowments as a material and mental being. For this purpose it will be necessary to leave out the influence of revealed religion upon human society, though the indirect influence of that religion on the state and progress of the sciences and the arts—especially the former, and what may be called the scientific arts among the latter—has been by no means small. This, however, is not a subject of human beginning; and therefore, whatever may have been its advantages, Man, considered in his own nature, and the exercise either of his body or his mind, is not entitled to take credit for any of the influence which it has had, though there is no doubt that in many instances, and by many means, he has tended to lessen and retard this good, which revealed religion would otherwise have effected for him. As Man is a being of earth, and this is an emanation from heaven, it may be laid down as a general truth, to which there is no exception, that he can never mix any portion of his earthly system with this religion without in so far contaminating that which is from above. Of this, however, we speak only incidentally.

There is, however, an indistinct species of religious feeling, which seems radical in the very constitution of Man, and without which, considering that he is a mental, or spiritual being, as well as an animated and merely sentient one, we could scarcely imagine him

to exist. We have proofs of this feeling in the fact that all nations in whom the developement of mind can be said to have begun, even in the faintest glimmerings, have some sort or form of idolatry or mythology,—some notion that there is an existence different from, and superior to, all that is perceptible by their senses, however shadowy and ridiculous this very rudimental notion may appear to us. And, when we follow the progress of mind a little further in the march of civilisation, but still without any thing revealed, we find that the evidence increases to nearly demonstration of this, and of somewhat more than this. When we turn our attention to the more civilised nations of ancient times, to the Egyptians, the Babylonians, the Phœnicians, and the Greeks, we find that the worship of the gods not only kept pace with the arts and the intelligence of the people in other matters, but that it took the lead, and actually stimulated them on to the others; and but for the gods, we should probably never have heard the strains of the Grecian lyre, or have admired and imitated, and tried in vain to excel, the remains of Greek architecture and sculpture. Nay, it is doubtful whether we are not indebted to the gods, that is, to the belief in the gods and the worship of them, for the dawnings of philosophy, and, strange as it may seem, for the beginnings of the cool and precise science of geometry, far removed as it is understood to be from the ever-varying tints of fancy, and the ardent but sportive glow of imagination.

Among ruder men, the case has been found to be

still the same in its essence, though of course very different in its appearance. The natives of New Holland, when first visited by Europeans, were exceedingly wretched in their condition, and rude in all their appointments; but still, when they were questioned about their ancestors, though they could give no explanation in words, they could point the finger to the sky, while an expression more than common lit up their most peculiar physiognomy: and, to those who, enjoying the light, endeavor to cast the darkness of their own shadows upon others in intellectual and spiritual matters, there was more sharpness of reproof in that simple and silent finger, than in a verbal oration by the most eloquent advocate that ever mounted rostrum. The inhabitants of New Zealand, though not less treacherous in many traits of their character, were more intellectual; and they had a mythology,—a most whimsical one according to our notions, no doubt, but still a mythology. From these facts it will be seen, that if we are to consider aright that knowledge which Man has acquired for himself, as a means of knowing his natural capacities, we must not wholly exclude religious feeling of some kind or other.

With these understandings, that popular knowledge of Man, which may be considered as essential to every one who would make the best use of his time in this world, without any reference either to hopes or to fears of a future state, may be considered as consisting of four distinct parts or sections. But this consideration is more in the simplification of the subject, so as

to make it more easy, than in real nature. We cannot appeal to Man as body, without appealing to him as mind; or as mind, without appealing to him as body. In like manner, we cannot fully and effectively run over even the outline of these, without reference to the moral condition of Man, and to him in his social relations as a member of organized and regulated society: because, without taking his moral condition into the account, and regarding him as a member of organized, civilised, and regulated society, we cannot find Man in such a state of developement and improvement as will answer our purpose.

But still, we may make such a virtual analysis, as may help us very much in the simplification of the subject; and, for this reason, we shall consider Man in four separate points of view, to the first of which we purpose to confine the sequel of the present volume.

First, *Physical Man*. Under which designation we shall consider the structure, adaptations, and senses of the body, with some hints for the culture and improvement of the last; though, in the course of doing this, we shall probably be obliged to make some short and occasional references to other parts of the general subject.

Secondly, *Intellectual Man*. This will carry us to a much greater length than the former, because this is the part of the compound nature of Man by means of which what has been once known, or in any way experienced by the individual, returns again when it

is required, and often when it is not wanted, in what we call memory or suggestion.

Thirdly, *Moral Man.* In the first and second divisions of this subject, according to the method proposed, we shall necessarily be restricted, in a great measure, to that which Man is capable of doing and knowing, without much, if any, reference to the pleasurable or the painful effects which it may have upon the individual or others; but in this division we shall have to consider the emotions, in which chiefly our happiness or our misery lie, and which have reference to those with whom we are more intimately and personally connected, as well as to ourselves.

Fourthly, *Social Man.* Under which we shall have to consider the reciprocal duties which subsist between the individual and that society of which he forms a part, the obligations which he owes to the society of which he thus is a member. In this department it will be necessary to analyse the principles of many of our most popular subjects of conversation and attention;—governments, and their influence; legislation, in its temperance and its intemperance; national churches, systems of education, and institutions of various kinds, with their real and supposed uses, and the abuses to which they are all more or less subject.

In all these, however, and indeed in every part of the book, real information must be the object, and not controversy. Truth and philosophy are of no party, though all parties would do well to cultivate a closer acquaintance with them than they sometimes show.

The object will be to show the real principles of these and all other matters alluded to; but they will not be given in skeleton; they will be clothed with as comely an investiture of flesh as the shape of the bones will admit; and if, as is more than probable, we shall sometimes have occasion to use the scalpel, we shall use it gently, and not take the smile off the visage of the patient. The remainder of the present volume will be devoted to the first of these four branches.

CHAPTER II.

IMPORTANCE OF SELF-KNOWLEDGE.

THE aphorism of Lord Bacon that "Knowledge is power," is one of those short sentences to which every body assents, and which has been perhaps more frequently quoted by writers than any other. But, like many other general truths, to which assent is given by custom or fashion, it is very doubtful whether one in ten of those who assent to it and use it, understands its meaning; and yet that meaning is the foundation upon which the knowledge of ourselves, as the basis of all other knowledge, must be established.

We admit that "knowledge is power;" but the aphorism is expressed in terms too general for being applicable to any one practical use. We must know "what the knowledge is," and "to whom" it is said to be power, otherwise the aphorism may not only be not true, but its opposite may hold, namely, that "knowledge is weakness"—the absence or the destruction of power. As this is an elementary matter, which meets us at the threshold of our investigation,

and as it is equally applicable to every species of knowledge that we can obtain or desire, whether of ourselves or of any thing else, it must be carefully examined.

Now, as to knowledge being "power," that is saying nothing, unless we understand what we mean by power. But there is nothing which we can call power that can be palpable to any of the senses as a separate subject of investigation. The power is a quality of some agent, and yet it is not perceptible in that agent as those qualities are to which we ascribe no power. The shape, color, consistency, and all the common distinctions of objects which are perceptible by the senses, are not powers. No substance and no state of a substance is in itself a power; the power is shown in the change from one state to another, and unless we actually have seen a similar change take place, or are informed of it upon testimony which commands our belief, we know nothing about the power that may have been exerted in the case.

It is true that we have a general feeling of power, as inseparably connected with every thing we observe or hear of. In this sense we feel that which has *placed* things in the condition, posture, and situation in which we find them, and it is a general or short expression for an agent, and the action or effect produced by that agent. As such it is a mental feeling and not a perception by the senses; and therefore we may conclude that no inhabitant of the earth save Man has any feeling of power, even in this very vague and general sense.

But this general feeling is not knowledge, though it is unquestionably an element of that compound feeling which constitutes the desire of knowledge, and by doing so puts us in the way of the attainment of it. If the use of our senses is accompanied by even the faintest glimmering of thought, this feeling of power invariably takes the lead. We see the furnishings of a room, the flowers and shrubs of a garden, the streets and houses of a city, the crops on the fields, the wild plants on the waste, the waters of the sea, the clouds in the atmosphere, and the heavenly bodies in the sky; we hear sounds, we smell odors; the states of the atmosphere, the conditions of our own bodies, and the influences of our desires and fears, our exultations and depressions, all have an influence upon our feelings; and in each and all of these, and in every case that can be named or imagined, we have a feeling of power, a feeling that some agency has had, and exerted, the power of producing those effects which are thus palpable to our senses or our general feeling.

Some have denied the existence of this feeling, upon the ground that there is no object of the senses which answers to it; but this species of argument, when followed out, leads to the denial of all knowledge, and to that of all the subjects of that knowledge. Our knowledge of a thing is not the thing itself, neither has it the slightest resemblance to it, even when it is of that kind which follows instantly upon sensation. Thus our knowledge of a triangle has not three sides and three angles, whether there be the figure of a triangle before our eyes or not; and our

knowledge of gunpowder would never of itself propel a cannon bullet, or blast a rock. It is the same in every other case; there is something wanting; and if we rested with the simple fact of the knowledge, the reverse of Lord Bacon's aphorism—"Knowledge is not power,"—would be the truth.

But, though knowledge is not, and cannot, in itself be power, any more than thinking can be the subjects thought of, yet it is the means by which we find out where power is to be obtained, or to what it is to be attributed; and perhaps the very strongest and most ready and willing feeling of our nature, and the one for the possession of which we have the most reason to be grateful, is the desire of knowledge,—a desire which is unsought for and universal, in the very early periods of our life, and which would continue with us to the end, if less worthy feelings were not encouraged to deaden its activity or to usurp its place.

One of the most generally pernicious of these is the desire of possession—a desire which is most commendable in itself, if we seek for its gratification through all the intermediate steps, and fairly win before we attempt to enjoy; but if we take the opposite course, and endeavor to enjoy before we have won, we, in the case of that which can be possessed as property, render ourselves obnoxious to the laws of society. Thought cannot come into court as a matter of litigation; but still, if we attempt to get over the middle part, and come at once to the conclusion, we practise the same violation of the law of nature upon ourselves, as we do of the law of society, in the case

of others, when we attempt to get possession of their property unjustly.

Thus, though knowledge is so far from being power that it very often consists in the discovery of the fact that we neither have nor can obtain any power whatever, in very many of the cases in which we seek it, yet it is scarcely less valuable to us in these negative cases than it is in the positive ones. In the positive case of knowledge, we can go directly to the object which that case points out to us, if we are in possession of the means which will enable us to accomplish this object; and if the means which we have are not sufficient, the discovery of that insufficiency is exactly the same in effect as the discovery of an error of any other kind, and of course ranks among the negative species of valuable knowledge.

Our negative knowledge, whether it relates to the fact that the event wished for is not, in its own nature, attainable, or to the discovery that we are not in possession of means adequate for its attainment, can scarcely be said to be of less value than positive knowledge, if, indeed, it is not of more. One of the principal causes of this is the extreme activity of the desire of knowing powers or causes. In countries and ages where there is but little accurate information, the activity of this principle, and the want of information by which it may be guided to the truth, or find at all times rational subjects to engage its activity, are the primary causes of all the superstitions and errors to which people in such a state have always been so much exposed; and there is an inveteracy in super-

stitions and errors of this kind, which does not attach to the errors of more enlightened ages, how great soever these may be. The reasons of this are readily seen and easily understood. Ignorant people are exceedingly prone to take up opinions without inquiry, and repeat them in their ordinary conversation; and thus, among them, an erroneous opinion gets easier into use as a matter of every-day speech, than a well-founded one does among those who are more intelligent. But again, it remains longer in use, inasmuch as new opinions are not produced nearly so fast in these comparatively dormant states of society, as they are when all is bustle and activity. Thus we find that in Britain, in former times, events not only continued subjects of conversation for years, but were even admitted upon the public record, though much inferior in importance to those which are now forgotten in a week from the time of their occurrence. Thus, for instance, the visit of Paul Jones to the coast of Scotland did not produce one tenth of the bustle at the time, as the visit of George IV., and yet there is no question that it is already by far the better remembered occurrence of the two. This speedy passing of the memory of events into oblivion, after they have ceased to be useful, is one of the greatest advantages of an informed and active state of the public mind, not only because it clears away lumber, but because it prevents that lumber from getting venerable through age, and thus becoming matter of superstition.

But every member of society has to pass through

an age of as complete ignorance, as that of the most early times of the society of which he is a member, or from which he is descended. Nay, it is more so in the life of the individual than it is in the case of any nation which has an historic record, for the individual has to come from total ignorance to whatever measure of knowledge he may obtain, and that within the comparatively short period of threescore and ten years: whereas no nation has been ever found so rude as not to have some language; and as language is wholly a human invention, the invention of any language, however rude it may appear to literary nations, always implies a considerable progress in knowledge. It must be admitted that the young member of society possesses some advantages in that part of education which precedes the use of language, inasmuch as all the information which is thus acquired is real and experimental, so that nobody can mislead by false opinions.

There are some curious circumstances connected with this, which are well worthy of attention by those who wish to see the human subject trained in all the branches of that most useful of all kinds of knowledge —the use of its own compound system of body and mind. We cannot leave mind out of the question, in the acquiring of the very simplest portion of elementary knowledge; as, even in the most rudimental act that can be performed by the infant of an hour old, or even before it is born, we can form no conception of any living action of a human body in which the mind is not present, and we are quite sure that the mind

must have a share in every thing that can, in any way, be regarded as knowledge. But still, there seems every reason to believe that our first lessons, in which none can assist us, are lessons in the knowledge and use of the body, and of the general sensibility or muscular sense, before any of the peculiar modifications which have their chief seats in local organs come into play as inlets of any kind of information.

Now, we believe that we are borne out by general observation, when we state that, during this early period, the children of the peasantry, if they are kept clean and healthy, and enjoy free and wholesome air, make much more rapid and useful advances than the children of the wealthy classes, who have every apparent want and wish anticipated, and are spared the use of their young muscles in every kind of exertion. Thus it is by no means improbable that the very kindness of those who have the nursing of these artificial plants, tends not a little to their weakness and helplessness; and that the self-education of the body which is thus kindly counteracted before the infant can lisp or totter about, may unfit the body for its proper functions through life, not merely in the performance of mechanical labor, but in the free and ready use of the body as the indispensable servant of the mind in the acquiring of every kind of knowledge. The fact is certain, that those who do make their way to the higher places of society from humble origins, have always more energy of character than those who, according to the common saying, are born for those places. There are certainly some professions, for the

effective discharge of the duties of which extensive and varied knowledge, together with great personal energy, is requisite, and of which, hitherto at least, the most efficient members have been obtained from the humbler ranks of society. But, in ordinary estimation, persons from those ranks labor under the disadvantages of rude society and little schooling; and it is not easy to state any compensation in their favor, save that, in infancy, they are left more to themselves in the education of their bodies, and that afterwards they have more personal exertion to make in the education of their minds; or, generalising the two, they are thrown more upon their own resources, and thereby made more independent beings than they would have become under the opposite circumstances. Some of these points are, however, involved in considerable obscurity, and require a train of argument upon which we have neither wish nor necessity to enter.

Generally speaking, the individual during his age of ignorance, is exempted from many of the dangers from which the people of a country, during the age of their general ignorance, have no means of escape. There is a buoyancy in young life, and an incessant thirst for novelty and excitement by new objects, which will not allow the attention to dwell long enough upon any one subject for confirming that into a settled superstition; and thus, though there are very many superstitions and prejudices planted in the young mind by those who are about the party, and have an influence, there are very few in any case, and none in many cases, that can be said to be of native growth

These observations will tend to show that the aphorism is not an absolute truth; but that knowledge is power only when it points out the power, the means of putting that power in operation, and farther shows us that we have the command of those means and the capacity for applying them. All these, then, are necessary in order to make it actual power in our hands; but they are regular steps, and each of them, considered in itself, is so much done. If we know the power, we are obviously in a better condition than if we were ignorant; and if we know the means, we are better still; because then we can know whether we have or have not the command of them; and if we have not, this knowledge may put us in the way of obtaining it at some future time. Thus, though it is only when perfect that knowledge comes up to the full encomium involved in Lord Bacon's aphorism, yet every stage and degree of it is in so far good.

"To whom is knowledge power?" is the second question arising out of the aphorism; and it is of much more importance to our main subject than that of which we have just given a few illustrations, because it goes more directly and forcibly to establish the value of self-knowledge.

Now, it must be apparent to every one, that knowledge, supposing it to be of that kind and degree to which the name of power can be properly applied, can be power only to those who are in possession of it. That knowledge, which is power to all who are in possession of it, is, for that very reason, weakness to

all who are not; because, in proportion as it operates as an advantage to the one party, it must operate as a disadvantage to the other. This is the case with all power which is unequally distributed among the members of any community; for, in proportion as it gives superiority and advantage to those who have it and can exercise it, it is a disadvantage to those who have it not.

Whether the inequality thus produced does or does not contribute to the general weal of a community, and conduce to more happiness and improvement than if all were perfectly equal in respect of power of any kind, is not the question at present under discussion; but belongs to the social condition of Man, and will come under our notice in one of the subsequent volumes of this series. That which we have to deal with in the mean time is simply the comparison of one individual with another, without any reference to the status or importance of either of them in society, but merely for the purpose of grounding an argument to prove that the condition of the individual must be improved in proportion as his physical powers, both of observation and of action, are cultivated, even though his cultivation in other respects may greatly lessen the value of those powers as compared with the whole. One or two cases in illustration of this may not be altogether improper, and we shall take them as varied as possible.

In the first place, there can be no doubt that the improvements in the modern science of war—and revolting and perhaps unnecessary as that trade is,

it will be admitted that there have been very great improvements in it—there can be no question that these improvements have greatly lessened the value of the personal strength and courage of the individual soldier, whatever may be his rank in the service. Very much of these has been taken away, and thrown upon tactics, appointments, and discipline; and the whole character of the art has been changed thereby. Animal strength and physical courage have given place to higher principles, that is, principles that have not so much tendency to stir up the angry passions of individuals as those which came into play in the old way of fighting hand to hand, and rousing the indignation by taunting speeches, as Homer says was the practice with even the heroes whose deeds are recorded in the poems ascribed to him. In consequence of this, vast numbers of men are understood to take the field, not only without any personal animosity, but with the most kind and gentlemanly feelings toward each other. Yet still, though the importance of the physical character of the soldier, in respect of the whole army and its apparatus, has thus undergone a change, there is still a distinction between soldier and soldier, on the ground of their physical efficiency. A man who knows his duty, and who has strength to undergo the fatigue of it, and firmness to do it steadily, bravely, and well, is preferred to one who is cowardly, unstable, or treacherous.

In civil society, in the second place, it is the same; and the illustration here is both more pleasant and more profitable. A time *may* come when the world

shall grow wise enough to dispense with the soldier, even in his present improved condition; but if we had a prospect of the abolition of civil society, the contemplation of it would be far from pleasant. Now we shall take one of the most ordinary characters and also one of the most exalted, that have come down to us from the times in which there was comparatively little improvement in the country, and see how it stands in the case of their value.

The knowledge which has multiplied to so vast an extent the physical power which we apply to so many functions, and which has produced machines and tools, which really do more work, and do it better, in Britain, in one year, than the physical strength and the unassisted hands of all the men now living on the face of the earth could accomplish in an age,—the knowledge which has achieved this, is surely not power to the man who has nothing but his mere bodily strength and a pair of uneducated hands. The value which such a man has to bring forward to the common stock has not only fallen, but fallen many hundred per cent., in comparison to all that is done. And be it remembered, that men are not born with greater physical powers, either for observing or for acting, than they were in the times gone by, when none of these methods was discovered, and none of these machines contrived. Therefore, taking the question abstractedly, Man is in a much worse condition at his birth, at the present time, than he was then; and if he could know even all that he must observe and understand, and all that he must perform with his hands,

before he is fit for even one of the most humble occupations in society as it is now constituted, the mass would sicken him, and he would give it up in despair.

Is it a physical disadvantage to us, then, to be born in an age and country whose arts are so much improved, and whose resources are so developed and multiplied? Quite the reverse. This is the grand inheritance to which every Englishman is born—a far more valuable one than any legislation could by possibility confer; and not the least part of its value consists in this, that though there is a share, and a share to which no limit can be assigned, for every man that is born in the country, each individual must win his share and be worthy of it, in order that he may obtain and enjoy it.

And, if there is any man who must prepare himself with more assiduity and zeal than another, it is the man whose chief dependence is upon his physical powers —upon the observation of his senses, and the application of his hands. If the task is great in this case, the encouragement is equally great; and the task never naturally and properly presents itself in such a mass at a time, as to diminish the hopes or damp the ardor of him who sets about it. It is gained by easy steps, each of which makes the labor of the one above it only half of what it was before that one was taken. Thus, if the bodily powers, whether of observation or of action, are willingly and vigorously employed, the nature of the mind is such that it will not remain idle; and such is its quickness, and the impossibility of fatiguing it, that it will educate itself, and at the

same time so assist the senses that they will perceive twice as much, and the hands that they will perform twice as much, and both will accomplish their work twice as well: and not only this, but the mind can prepare the body for the work, and the work for the body, all unknown, even when the eyes are closed and the hands folded in the most balmy and refreshing sleep.

The encouragement—the example of those who have gone before—is, however, the grand matter. We see the results in all their imposing characters, and we do not see the labor which they cost. Take the instance in any thing we please—in the enjoyments, the accommodations, the ornaments, personal, domestic, local, or national, with which the country so much abounds—in the facilities of intercourse, by means of which days are condensed to hours, and degrees of longitude to miles—in time spent, and consequently expanded in the same ratio in time to enjoy—in the improved powers, by means of which a few pitchers of water and a few pennyworths of coal shall do as much mere labor of force, as the strength of fifty men could accomplish in a week, or in the engine which performs by the stroke of a die in one minute what a man with a hand-tool could not do in a month. We may take our example in each or in all of these, or in a hundred others—ay, or a hundred modifications of any one of them all.

But even in the fulness of our admiration and delight at the contemplation of these wonderful results, we must not forget that they are only results. We must not forget the sharp eye and the ten fingers,

duly educated to the work; for these are the real authors of the whole. There is no occasion for undervaluing the seats of learning or the associations of learned men; but truly, for all our more substantial accommodations, personal or public, we are not very greatly indebted to them in the principle, and nothing whatever in the execution. The persons to whom we are actually indebted may have received varied portions of what we regard as common education; but one and all of them have had their real education in the workshop; and the most splendid and beneficial of them have been practical men, who have educated themselves up from the station of ordinary workmen, and who, when they began, were just as ignorant of mechanics, and made as bungling use of a tool, as we should do if we were to begin to-morrow. The workshop is the real school of experimental philosophy—the place where every hint is at once brought to the test of experience, improved if it is worthy, that is, capable of improvement, and thrown aside to give place for another and a better, if it is not. In it there are no theories dozed over from week to week, or from month to month, and which, in the end, pass away like idle dreams; neither are there any dotard projectors, who go boasting all their lives of the mighty things which they are to produce, and sink to their graves in utter barrenness.

That trains of thought are carried on in the mind, is all very well, because, without a full measure of these, the labor of the hand could not be improved; and that the results of these trains of thought, and

even the steps of their progress, should be recorded in writing and published and circulated in books, is still more commendable, because more useful, than if the train of thought is lost to the world when the thinker is laid in the dust. But truly these are nothing to that which is recorded, step by step, in real and practical results. The man who writes in the words of language, addresses himself to all who can, by the comparatively slow process of reading, make themselves masters of that language;—and science, long a cloistered monk, has not yet quite learned the every-day language of ordinary people. But he who records his thoughts in engines, or useful implements of any kind, addresses himself to the whole world, in a language which nobody can mistake, and which they who run may read, how much soever their conventional language may differ from that of him by whom the discovery and contrivance were thus written in an imperishable language, well known to all the world. Send an account of the steam-engine, and the manner of its application to the propelling of a ship through the water, to all the nations on the face of the earth, and it would not be understood by even those who were previously acquainted with the technical phrases of the English or other language in which the account was written: send a steam ship to circumnavigate the globe, and something would be known of it by even the rudest people that had curiosity enough to come and inspect it.

But this is not all; for, in proportion as the actual and useful result—that to which the contriver gives

his hand as well as his word and thought—is more easily understood, and more readily appreciated, by those who would not understand the verbal description of the contriver, either in speech or in writing, even so is it much more comprehensible by the comparatively illiterate of his own country. The mechanical production, be what it may, speaks directly to the senses, and through them to the minds of all who see it and feel an interest in the sight, whether they could or could not describe it in language, or even read or write. The instruction, even the mental instruction, which is obtained from the contemplation of these things, especially early in life, and the bias and purpose which that gives to the mind, are often surprising. One of our foremost civil engineers, and one of our most scientific writers upon constructive carpentry, are said to have derived the rudiments of their professional education and their professional bias from the fact of playing truant at school, that they might witness the progress of the construction of agricultural implements in the workshops of Meikle, the contriver of the thrashing machine; and there are no doubt hundreds of instances of the same kind if they had been recorded. We know that the late Mr. Nimmo, whose talents as an engineer were of so much service to Ireland, and would have been of so much more if he had not been carried off in the middle of his career, learned his mechanical knowledge in workshops, and his engineering in studying the practical operations at the Caledonian canal. It may be said that Nimmo was an able mathematician, and understood the prin-

ciples of physics well, previous to this; and we cannot deny that he did; but then, he ran wild for want of subjects worthy of him, and wasted his time and ingenuity upon such trifles as a system of "du-angles," formed by the intersections of two arcs of circles, which was a perfect *non-sequitur* in geometry, whatever ingenuity it might display.

Such are the advantages which mankind derive from the education of the body—from the full, fair, and free use of their faculties of observation, and the prompt and progressive recording of this in something formed by means of the application of the hand. In the case of such a man as Nimmo, it was not the fact of his being a mathematician that led him on to be a practical engineer: for we have seen a superior mathematician who could not by possibility have made the slightest improvement upon a mousetrap of the most simple construction; and we once saw a display by a man of first-rate theoretical ability, who had the whole doctrines of mechanical and chemical philosophy completely at his finger ends—but not in the grasp of his fingers, so as to be available for any practical emergency—in a situation so ludicrous, that we may be perhaps pardoned for mentioning the fact, though we of course purposely omit the name. On a beautifully tranquil, but very hot summer day, we had been sauntering along the bank of an estuary some mile or three quarters of a mile across: we wished to pass to the other side, and we were two miles and a half or more from the regular ferry, which was no joke in a day so sultry, and no resource but walking. A trim enough

little shallop "lay high and dry" near a salmon-fisher's hut, close beside us; and as the water was smooth as glass, and the demand of the fisherman very moderate, we at once resolved to avail ourselves of his craft. In brief time the skiff was moved to the water, and just as we were stepping on board, a countrywoman, an acquaintance of our Charon, applied for a passage. This was of course granted, and we put off. But the exposure of the boat to the heat had softened the pitch inside, and the dust had adhered and painted it stone-color. The seams, too, had opened a little, as those of any boat would do under the circumstances, but not much. When, however, we got upon the glassy water, and the little shallop, loaded with four—twice its ordinary complement, was gunwale in, the aspect of things became not a little alarming to our philosophical friend. The water began to ooze in at the seams of the skiff, and as it removed the dust it had a black and somewhat ungainly appearance. The very soundness of our craft made appearances more alarming, for the water came in at all the seams which were lower than the flood outside, and thus made a greater show upon the inside than if there had been one decided leak enough to swamp us. We had taken our place near the bow to trim the shallop, as three would have been too much by the stern, and we could not help noticing the looks of dread with which our philosopher eyed the blackening sides of the craft. There was a little platform in the bottom of the stern part, upon which appeared not the smallest symptom of the invading water. We observed the philosopher

more than once look to the countrywoman for some deliverance from his apprehensions, and at last she, in commiseration of his rueful aspect, assured him that there was "*some* way by which the water that ran in at the sides of the skiff, ran out again." At this his hydrophobia seemed instantly dispelled, and he chatted with the woman as if she had been an angel sent to relieve him from the torment of his own apprehensions. We said not a word at the time, or ever after, to the party; but we could not help feeling that if the very same case had come before him in the shape of a question in hydrostatics, he would at once have demonstrated that the water could not have run out of the skiff, except by an orifice farther from the bottom than that at which it ran in; and this at the same time brought to our mind the well-known adage that "an ounce of mother wit is worth a pound of clergy," which means, that a fact of which we have acquired the knowledge by our own observation and experience, is sixteen-fold more valuable and ready for use than if we learned it by book, or by the mere dictum of a teacher.

Innumerable anecdotes might be given of the total ignorance of men, very able and reflective scientific men, upon practical subjects, the principles of which they understand better, or at all events can explain much better in words, than the parties by whom the operations are carried on, and the most important improvements made in the conducting of them. This is no argument against the cultivation of the mind by the prosecution of abstract studies; but it shows

us that if we are to make the results of those studies available for any purpose of practical usefulness, we must have frequent reference to the senses, and take the whole man along with us, the body as well as the mind, giving each its due share in the matter. To whatever extent the mind may proceed in its speculations, by means of reasoning only, this much is established by the most indubitable evidence,—that it can have no knowledge of this world of reality but through the medium of the body. But the subject is of sufficient importance for being treated as one of the leading topics in another chapter.

The other instance which we shall give of a party transmitted down, under the same name, from times of comparative ignorance, to whom knowledge has not been power in the original sense in which power was defined, is that of a peer—of one who has descended from a feudal baron of the middle ages, or, which amounts nearly to the same thing, who has acquired the same appellation by whatever means or for whatever purpose, for these have nothing to do with the matter. Has knowledge been power, that is, baronial power, according to the spirit and intention of the original institution of the order, to such a person as this? On the contrary, it has annihilated his power, and reduced him to a mere cypher as compared with what he was in the olden time. There is no doubt that it has been of real benefit to him in so far as enjoyment and true dignity of character are concerned; but the power is now simply that of a man, and all the elements of it might be possessed by any man

who could afford to purchase them in the market, whether he be peer or not, and without the least reference to his ancestry. The peer cannot now exercise the power of life and death; there is no dungeon in his dwelling; and he has no embattled tower from which he can frown defiance against even the messengers of his sovereign. He cannot lead the people around him to battle and plunder in his private squabbles, or for the furtherance of his ambitious views; and we hear no more of feasts at which a hundred beeves and a thousand muttons are served up, together with fowl of every wing and fish of every fin, with an entire porpoise at one end of the table and a whale's tail at the other.

All this, and much more than this, which was the emblem, if not the essence, of baronial power, is gone, never to return; and if the owner of a title now aims at being a person of consideration, the talents of the man must be such as to throw the tinsel of the coronet completely into the shade. But still he has only to bring himself up to the spirit and character of the times, and he is a greater man than ever. A man cannot be truly great except in a great age. A farthing candle is a great light in the dark; but the blaze of Etna is barely discernible in the clear light of the sun, and if it is discernible, it is on account of darkness rather than brightness, of smoke rather than of flame. But as all worldly desires, beyond the mere desire of that which shall supply the physical wants of the body, are resolvable into the desire of notice from others, the modern peer can if he pleases command

this to a far greater extent than could have been engaged by the most lordly of the olden time. If he does that which is estimable, he has the approbation of Britain in a week, of Europe in a month, and of the world before the circle of the year comes round. No doubt, in the case of his doing that which is not approved, the lash of disapprobation is laid upon him in the same manner, and to the same extent; but this is his wholesome admonition to "cease to do evil," while the former is his warm invitation to "learn to do well."

Thus we have attempted to show, that the general diffusion of knowledge in modern times has been not power but weakness, to the two extremities of civil society, estimating them according to what may be considered their primary claims and qualifications in former times—that is, physical strength and an untutored pair of hands at the one end of society, and unlimited power over the lives and fortunes of a certain number of their fellow-men at the other; and if the original distinctions have been weakened in these, and new ones rendered necessary, the same may easily be inferred to have been the case in all the intermediate portions of society.

This change has been brought about wholly by the developement and application of the human powers—by thinking and acting alternating with each other, the action recording the former thought, and affording the means of suggesting a new one, either to the former thinker or to some one else, and the successive thought being recorded in some practical application,

in the same manner as the antecedent. It is in this way, by the mind taking its primary lesson from the senses of the body, improving that lesson, and giving it back to the body to be recorded in a new subject of observation; and this simple alternation—often by very small steps in the individual instance, but by those steps often repeated, and the admiration of new observers, the ardor of new minds, and the labor of fresh hands and improved tools and implements brought to bear upon them—has reared that splendid structure which we see every where around us, and which continues to receive additions and ornaments at a rate which is rapidly increasing every day.

Thus, even in a physical point of view, there has been added, in every country which has felt the impulse of civilisation, but in England more than in any other, a new world, in supplement to that which Nature presents to the savage. Hence, we have a double field both for our observation and our reflection. We have that which Nature produces, and we have the modifications which Man has effected and continues to effect upon it, so as to make it more agreeable to his senses, or otherwise more conducive to his comfort.

In all the thickly-inhabited and well-cultivated places of the country we have these two worlds—creations shall we call them?—the world of nature and the world of art, so completely blended together that we are unable to say in many instances which of them predominates—the balance between the two is in such equal poise. We are indebted to art for the flowers in our gardens, the plants in our fields, and

the trees in our forests, to such an extent that if we any where meet with a patch of land in what may be considered a state of nature, it is barren and unprofitable as compared with the rest. It is true that we must enlist Nature into our service, inasmuch as we cannot get the species except by means which Nature has appointed; but then the very principle is plastic in our hands, and if an ordinary person were to seek in wild nature for those ornamental and useful plants which we see cultivated in such numbers, and with such apparent ease, assuredly he would no where in the wide circumference of the earth find one in ten of them. The parties who are interested in procuring them, and who have kept records of the changes, know what was changed; but even here, there are many of which the changes reach beyond the commencement of the record, and in some of these the native plant is not known.

With our animals it is the same: all domesticated ones and all the semi-wild ones which are kept in preserves, are in so far artificial, or cultivated. We live upon artificial beef and mutton; and our sportsmen course artificial hares with artificial greyhounds, and follow artificial foxes with artificial hounds, and mounted upon artificial horses. Even the very birds have undergone a change, and a change in which no small part of the agency may be attributed to Man. The screaming and booming have gone along with the stagnant waters, and in their stead we have the call of the partridge and the pheasant, and the seasonal song of the nightingale. Nay, the very elements

have been reached by the labors of Man upon the soil; and the seasons, as well as the scenes, of our present England, are not those of the England of seven hundred years ago.

Now, this artificial world, or at all events, this world so much modified by human skill and labor that wild nature may, in some degree, be considered as only the materials out of which it has been moulded, and in which we have an epitome of the whole world within the four seas, not merely in its produce as simple articles of commerce, but in no inconsiderable number of its growing and living subjects, in a state of health and productiveness, and in many instances in a state of improvement—this singular world of our own forming, is the world in which we live, partakers of its advantages; and, therefore, we are under a filial tie, stronger than words can express, not to be unprofitable children during the time of our sojourn in this, the home and habitation of our most beneficent parent.

The fact is, that the state of the country at the time of our birth, or at the first moment that we could look upon it with an eye of understanding, has a new claim upon our patriotism, a claim which was not known only a few centuries ago; but which has strengthened upon us with every succeeding year and day of our lives, and will continue to strengthen more and more to future generations, for a period to which we can in the mean time see no end. This is binding upon us as a tie of a far more intellectual, and, therefore, more sacred nature, than the attachment of the

Highlander to his mountain, the Indian to his forest, or the Arab to his wilderness. These attachments are, in a great measure, to physical nature—to that which cannot reciprocate with Man in return; and therefore his attachment partakes more of poetry than of philosophy; of romance more than of gratitude for favor conferred or good enjoyed.

The common-sense value of these romantic attachments to country, as well as of all romantic attachments, under what name or denomination soever they may come, is at once explained by the fact, that the most is displayed where the least is deserved. This is the case in every species of idolatry; for always, the more worthless the idol—the less that it can partake in any one of the qualities on account of which it is worshipped, the worship is ever the more fervent in itself. This places the love of country, among the people alluded to, in the class of mere unmeaning idolatries, how much soever we may admire the warmth and sincerity with which it is paid; for it is part of the constitution of our nature to love warmth and sincerity for their own sakes, and without taking time to scrutinize the causes by which the display of them is called forth. But the obligation of the native of a country in a high state of improvement, is to the men by whom those improvements have been made; and the course and progressive increase of those improvements are the most valuable part of the heritage which is transmitted from generation to generation, and the promoting of which, to the utmost of his

power and means, is a duty to his country of which no man can divest himself.

It is a very great inducement to the discharge of this duty and encouragement under the performance of the labor, whether of preparation or of direct application, which may be necessary for this purpose, that our own reward is in exact proportion to the ability which we display in this performance. This reward we cannot obtain unless we perform the duty, and we cannot do that unless we know our own powers, both physical and mental; and not merely know them, but endeavor to ascertain by what means they may be cultivated so as to give them the degree of efficiency which is necessary.

The necessity of this even for our own best interest, requires no lengthened argument, and no induction of cases in illustration. A good tool is an advantage to even the best educated and ready hand, though the hand is so much superior to the tool, that the very best artists are never the most particular as to the tools or instruments with which they work; and in some professions it has become proverbial, that those who are fastidious about having the very nicest instruments are comparative bunglers in the use of them. Not many years ago, we were in the counting-house, or *studio*, or whatever else it may be called, of an eminent London engineer, where a provincial engineer, who had come up to town upon parliamentary business, was finishing a very beautiful perspective elevation of a public work—a large bridge, if we rightly remember. The lines were perfect in their

form, their firmness, and their symmetry, and it seemed as if the workman was occupied in tinting an engraving by Lowry or Turrel. "Show me your instruments," said another engineer, who came in while we were there. A pair of old rusty compasses, with crooked legs, a bit of quill to fit upon one of them as an ink-foot, and a little iron drawing pen, as black as the lines which it had traced on the plan, were produced from an old razor case lying on the table. "Have you no other instruments than *those?*" asked the visiter, in amazement. The other laid down his brush, and holding up two well-formed and strongly-muscled hands, which we know had in former times brought beautiful forms out of shapeless blocks with mallet and chisel, said, "There, that's enough;" and if the most oratorical lecturer of the age had held forth on the subject for an hour, he could not have passed so striking, so truly eloquent an encomium upon the value and use of well-educated hands.

We might go over the list of all the organs of the body, and of all the capabilities of those organs, either in the way of obtaining information or in that of executing work; and we might show that there is in each a vast volume of ability, if it were only called forth by even moderate instruction and exercise: but this subject is far too important for being slurred over incidentally in a paragraph.

There is, however, one consideration which it may not be improper to name here; and that is the culpability of devoting so complete an instrument as the human hand to labor quite unworthy of it. Is it

not a strange, a sad, a fatal prostitution, that an instrument which can fetch the most symmetrical forms, in the most graceful attitudes, out of shapeless lumps of stone, or mould them of kneaded clay,—that can animate the canvass with all but pulse and breathing,—give the state of a battle, or the story of a life, to one glance of the eye, with far more truth and effect than any verbal description or even the actual presence of the scene itself,—that can thrill the heart by the vibration of a string, or carry the affections captive whithersoever it lists, by merely touching catgut,—is it not the most cruel, the most profligate prostitution—profligate in one of the best gifts of Heaven, that this most extraordinary and most serviceable of all instruments should be occupied, during the whole useful portion of the life of its owner, in turning the same wheel, or striking uniform blows with the same small hammer? Shall we debase this instrument by dooming it for life to perform that which could be as well done at the expenditure of one tenth the labor of a donkey, or by a falling stream, or a boiling kettle? Surely this would be doing great injustice, even in the humble and humbling mechanical view of it, to the foremost of all machines—the machine of God's own making—the one which makes all the others!

But even this, bad as it confessedly is, is by no means the worst, either for society or for the owner of the prostituted and degraded hand. There is a mind—an immortal, thinking principle—a principle capable of reading, by means of the body as its instrument or

servant, the whole of the heavens and the earth, and all the workings and wonders of human talent and industry upon the latter,—there is such a mind bound to the trundling wheel or the alternating hammer,—a wretched and miserable slave, having no enjoyment of itself, and rendering no service to the world; and so monstrous an injustice both to the one and to the other, ought not to be tolerated in a land of rational beings.

It may be very true that the man who is thus sacrificed may beg to be continued in his drudgery, and may regard his deliverance as the taking away of what he looks upon as his birthright; and we have known ferry boatmen to march in mimic mockery of the grave, and bury their oars, when a bridge was thrown across an estuary, and they were prevented from toiling at the oar for one half-penny, when they had only to put a little bit of canvass and a few cords to their boat, stand a few miles out to sea, and fetch a wholesome dinner for fifty families, with scarcely any additional labor. Thus is the mind reduced to the most abject slavery, and made the victim of the most ridiculous fears, when the hand is confined to the constant repetition of that which has no excitement of novelty, and awakens not a thought. And there are not wanting upon the variously-checkered record of the human annals, instances of those who have been so early and so closely bound down in the slavery of others, that they have worshipped their fetters as their greatest good, as not knowing how otherwise to satisfy their bodily appetite, than by remaining in

their ignominy; so sadly may human nature sink if the balmy and buoyant gales of heaven play not around it.

But this is not the worst, or nearly the worst, that is sure to happen in such cases: degrade and neglect it as we will, the immortal spirit is still the immortal spirit; it is warmed by Heaven's own ethereal fire; and all the waters of the world's oblivion cannot quench it. Cut off from the field of its proper occupation and pleasure, its restless activity is thrown wholly upon the body; but there is still no scope for it in the occupation of the body, as that which a machine can do never can require the services of a mind. Hence, when the physical occupation of the body is thus narrowed to the dull routine of a single point, upon which the labor is executed without even any simple consciousness of it, just as the feet never stumble, even in the dark, at the inequalities of a path which has been trodden a thousand times over, the mind has no occupation but about the gratification of the appetites and passions, and those, too, of the most low and grovelling description.

Of the positive vices,—the low sensuality, the heedless and heartless life, and the frequent crimes perpetrated for the most unmeaning purposes, and on the most groundless provocations, we speak not; but we must say that, upon men in so low and lost a condition, the laws of God and man have no strength equal to even that of a cobweb. They are the most unsafe population wherewith any land can be afflicted, as they are at the mercy of every demagogue, local or

general, who may wish to stir up the dregs of society, in order that he may steal through the turbid tide to the dishonest possession of that which no man would award or abet him in, if the current of society ran bright and clear. We mention no name, we assign no local habitation; but witness the unmeaning mobs, the iniquitous combinations, of weak and deluded men against their own best interests; the burnings of property; the throwing of corrosive liquids upon the person from behind corners in dark nights; the organized associations, procured and paid for out of hungry bellies, for the furtherance of that which, if accomplished to the full extent of their unmeaning madness, would only make them more hungry still. Witness this, and witness it in an enlightened nation, and an age unprecedented in improvement, and say, if you can, if there is not something sad and sickening in that which can thus degrade those around whom the means of mental and moral improvement are floating thick as the motes in the sunbeam, to this, the very lowest degree that can be named or imagined in the intellectual, the moral, and the social scale.

Such are some of the fruits, and bitter fruits they are, though natural and necessary ones, of that system which *uneducates* the physical powers of the child, in order that the man may not count for more than a small fraction of a water-wheel or a steam-engine. The infant, before the fetters were put upon it, rejoiced in the breeze of the sky and the light of the sun; its eye sparkled with delight at the curling cloud

or the rattling carriage; the song of the bird brought the index finger instantly to the gladdened ear, and if the veriest villain looked it in the face, it would smile with joy that another subject was presented to gratify the young thirst for knowledge. Alas for the altered condition of the man?——but one sickens at the picture, and cannot proceed.

> "O, for a lodge in some vast wilderness,
> Some boundless contiguity of shade!"

It is in such revolting descriptions as these that we find the most striking if not the most agreeable illustrations of the negative argument for the great benefit that would result to individuals and to society, if men of all ranks were to know the true nature and action of their physical powers, and improve them by that culture, which is so far from being labor and pain that it is pleasure and delight—pleasure and delight of a far higher and more enduring character than that which results from the most luxurious gratification of all the appetites and passions taken together. If all that is observed, is observed with pleasure and for information, the better half of the world of our personal knowledge is our own, and our own by a security that cannot be taken away from us, run the course of the world as it may. In like manner, if we know our powers of action, and bestow but a very little attention on the cultivating of them—and the cultivation is a natural and necessary consequence of the knowledge—if we do this, our portion of the reward is sure, according to the extent of our well-doing; and so

we are in a condition to rejoice in every improvement that can be made, because we know that the benefit of it will be to us as well as to others, and that the closing of one path against our progress is but the opening of another, in which our well-disciplined steps will be steady and certain; and we shall be gratified by the charm of fresh occupation, and increasing usefulness both to ourselves and to others. This is the frame of mind, by means of which the great of all ages have bounded onward from one subject to another, till they have arrived at the very summit of eminence; and although that summit is but narrow, and will hold only a few, surely that is no reason why we should not get as near to it as we can. We cannot anticipate all the reserves and contingencies of life, and it is well, for both our success and happiness, that we cannot. But thus much is always in our power; while health and strength remain to us, we can command the capacity of being useful; and there are few contingencies in ordinary life under which this alone will not suffice to bear us up; and we have this fact established by experience, and new proofs given every day—that no man can be utterly cast down in the world unless he cast down himself.

CHAPTER III.

MAN ALONE CAN ACQUIRE KNOWLEDGE; HE CAN HAVE NO KNOWLEDGE BUT WHAT HE ACQUIRES; AND HIS ONLY MEANS OF ACQUIRING IT ARE HIS PHYSICAL POWERS OF OBSERVATION.

It might appear more systematic to notice each of the three propositions here enumerated in a separate chapter: but an appearance of system is not unfrequently the bane of writings, which profess to be popular, and to address themselves to those whose reading is desultory and taken in the pauses of other occupations, just as they happen to arise. This is the way in which all enjoyments afford the most gratification; for even systematic pleasures are painful from their formality; and they lose much of their zest, because, being planned before, they come upon us in all the stale familiarity of a twice-told tale. Besides, though these are three distinct propositions, they all bear upon the enforcement of one general truth, and that is, the necessity of knowing and cultivating our physical powers of observation.

In the first one—that "Man alone can acquire knowledge," there may seem something paradoxical, if not

incorrect; and yet there is no truth more certain in itself or more capable of demonstration, if we rightly understand what is meant by the word "knowledge," and limit the proposition, as it ought to be limited, to the physical inhabitants of the earth. There is not indeed any occasion or even possibility of carrying it farther: God, who knows all things from all eternity, can acquire no knowledge; we can give no opinion respecting the finite spirits shadowily alluded to in the Sacred Volume, though the analogy is against their having any knowledge of material nature; and as for the creatures of our own imagining, they can have no knowledge, for they have no existence.

The word "knowledge," like most other words which have no substantive representatives in the material world, is much more easily understood than defined; and yet if we take the Greek etymology, which, from the similarity of the sound, is most probably the origin of our word, it at once settles not only the meaning of the word, but the whole question as to the first of the above propositions. The Greek name for knowledge is the subjective form of the very same word which actively is the name of mind itself; and therefore the definition of it is, "that upon which the mind acts," or which it can employ in any process or train of thought, without the least necessity for the immediate presence of any external object, and of course without any need for the senses, or of general sensation. The Latin word *intelligentia*, which is used in much the same way, has the same meaning as the other, without being derived from it. It means

"that which can be read within," or by *intellectus*, "the internal reader," without any present aid from without—or it is the fact or capacity of this internal reading.

These etymological explanations involve in them the demonstration of the third proposition also,—namely, that the mind can have no original knowledge of the external or material world but what it receives through the senses; or, in other words, that the materials of all our knowledge are originally obtained by the instrumentality of the senses, and by that only. The structure which the mind can rear out of those materials, and the way in which it can be enlarged and improved from man to man, or from age to age, by the operations of the mind, is quite another matter, the investigation of which properly belongs to the knowledge of Man as an intellectual being—that is, a being that can work "inwardly," and of himself, altogether independent of the rest of nature, and even though the whole system of things were to be annihilated, though in that case he could, of course, receive no new materials for his working. The full analysis of this must therefore be referred to our volume on "INTELLECTUAL MAN;" but as the "body without the soul is dead,"—the physical part does not seem capable of the least sensation or knowledge of itself after it is separated from the intellectual part, it is quite impossible to understand the one in any thing like a useful manner, without a reference to the other. Indeed, how much soever systematic writers may virtually analyse the systems of Man, and treat

of the one without reference to the other, we must take the whole of them in their connexion, if we wish to have any knowledge of Man as we really meet with him in society.

In questions relating to that material creation which is palpable to the senses, and in which, whenever we either feel at a loss with our speculations, or wish to certify ourselves of their truth, we can verify them by a direct appeal to the subjects themselves, verbal arguments, and especially etymological ones, are not held to be conclusive; but, in speculations which are purely mental, and in which there is no possible original to which we can refer as an object of perception, the case is widely different. Besides the mental feeling itself, there is in these nothing to which we can refer but language; and as the feelings of one man not only cannot be made matter of demonstration to another man, but cannot be at all known to him, unless they are expressed in language, it necessarily follows that in them we have no demonstrations but verbal ones. No doubt there is often much ambiguity and uncertainty in these; but still, they are the best that we can obtain, for the gestures and other dumb-show expressions of the body are not only more unintelligible in themselves than language, but we can never analyse them so as to be sure how much to refer to mental causes, and how much to the mere feelings of the body itself, which have no reference to any thing mental.

Therefore, if we would consider the matter aright, the simple fact that the expressions used for know-

ledge refer to something inward and mental, in addition to the senses, ought to satisfy us that where there is no mind there can be no knowledge. Indeed, it ought to carry us much farther than this, and convince us that that which can know, must from the very fact of its knowing, be immortal, that is, independent of the fate and casualty of material things, and secure, not only against the changes of these, but against any ultimate destruction to which they can be subjected. When not one stone is left upon another, of a home with which I was once familiar,—when a human being with whom I was once intimate has mouldered in the dust, or been sunk in the extremest depths of the sea, my mental knowledge of the one or the other is not in the least impaired, neither is it one jot altered from what it would be if they were simply removed from the range of my senses, but still in the very same state of existence as when those senses brought me the means of my knowledge of them.

The destroyed and the dead are just as present and as vivid to thought as the absent; and we often feel far more pleasure in the mental contemplation of scenes which have been totally changed, than we do in those which are presently before our eyes; and hold sweeter converse with those that are in the grave, than with the most familiar of our living associates. This is a strong argument for immortality, and one which is altogether irresistible, if we would reflect upon it carefully and in the proper spirit.

The young are so pleased with the passing time, and so high in hope for the next change that the re-

volving wheel may turn up, that they do not much heed these matters. But when life has advanced a little, we find that our pleasure—our true mental satisfaction is much more frequently in the absent than in the present.

Then, when our mortal span feels to us as it were near its termination, whether from the casualty of disease or from the lapse of years, but more especially in the latter case, we live and enjoy more in the desolate and the dead, than we do in the present and the living. When the wine of life has been drained until it is bitter on the lees to the present taste—when the eye is dim to beauty, and the ear dull to the voice of the charmer—when our present sensations tell us of nought save pain and suffering, decayed powers, and uselessness merely tolerated by those for whose benefit we spent the best of our strength;—then, if we had nothing whereupon to rely but the body and its sensations, it would not be in human nature to support the grievousness of the burden: but in such cases, our knowledge comes wonderfully to our aid; and the mind repays in an ample measure those lessons which it received from sensation in the days of the body's activity. Worn out, neglected, alone, deserted, in the anguish of bodily suffering, and the extreme of worldly privation, a bright spot and a blythe companion once enjoyed, no matter how long ago, can come with delight to the mind, and more than medicinal balm to the anguish of the body. Far distant from the land of his birth, and brought nigh to the gates of death by disease, under the pestilent

burnings of some foreign atmosphere, thousands have been saved and brought back again to health and usefulness, by the kind labor of the mind in carrying them home to the place of their birth, and the fields and fellow playmates of that infancy, in which the head felt no ache, and the heart no pang. And there have not been a few of the human race, who, even when immured in the gloom of a solitary dungeon, from which there was not the slightest hope of deliverance, have lived joyfully in the society of their former friends even though dead, and risen superior in happiness to those whose vengeance had placed them there as the severest punishment that cruelty could inflict.

This is still an intellectual, not a physical consideration, but it is one to which we must advert before we can, even virtually, feel the distinction between the physical and the mental parts of our compound nature, so as rightly to understand either. Notwithstanding, we may, in passing, remark, that herein there is involved one of the most unanswerable arguments for the existence of an intellectual principle in Man, and for the immortality of this principle. If we were wholly animal—the body and nothing else,—then our whole happiness or misery would follow our sensations for the time, without the slightest variation; and, exposed to the contingencies which beset us, and which have no parallel in the lives of the other animals, there are many circumstances against which it would be impossible for us to bear up. The maimed and mutilated veteran, who is compelled to beg from

door to door, has his spirits buoyed up and his life sustained by the recollection of the deeds of his former days; and when he is moved by the tale of that day upon which his commander won glory and wealth, and he won —— the privilege of begging through life, he casts away all the miseries of the present, and actually feels vigor in those very limbs of which he has for a long period been deprived.

Is this the case, think you, with any of the animals? Do their memories of the past bear them up under the sufferings of the present? When the "high-mettled racer" comes at last to the severest drudgery, the harshest treatment, and the most scanty fare, is he in any way comforted, is the suffering of his present condition in any way relieved, by the memory of how he was petted and pampered in the days of his prime? We do not believe that there is one sane human being who would answer this in the affirmative; and yet this, when rightly considered, is decisive of the proposition that "Man alone can acquire knowledge."

It must be borne in mind that this is a question into the consideration of which time cannot enter as an element. For, if there is once a knowledge of any thing,—a feeling or perception of that thing which can remain or return in the absence of the impression of the thing presently on the senses,—the fact of its remaining an hour, a day, a thousand years, or for eternity, is not a matter of essential difference. If it can return without the sensation by which it was originally produced, it is just as independent of that sensation, and of the object occasioning it, at the end

of the longest time after the sensation as of the shortest; and thus the knowledge which we obtain by means of the senses of the body, is altogether independent both of the body and of the external objects by which the body was affected in the original sensation. The knowledge has ceased to have any connexion with them, from the moment that it became knowledge; and, therefore, their future destiny, whatever that may be, can have no influence upon it in any way whatsoever. If the bodily organs are decayed or paralysed, or if the body dies and is reduced into the chemical elements of which it is composed, and these enter into ten thousand new combinations, this does not in any way affect the knowledge which exists independently of the body. So, in like manner, if the whole frame of that external and material nature, of which the senses of the body have furnished the means of knowledge, should be molten into thin air, or pass into utter and final nothingness, still this would not, in the least, affect the existence of the knowledge, which, having nothing of matter in it, could not in any way be involved in the fate of matter.

But although, when thus abstractedly considered, the mind and the merely animal or sentient part of the human system are obviously and clearly distinct from each other, yet when we contemplate Man in nature, and compare him with the other animals, difficulties arise of far greater magnitude than we should be apt to suppose; and we are very apt to disbelieve, or deny in fact, that which seems so plain and so demonstra-

tive in philosophy. The real cause of this lies in the fact of the mind in Man not being in any way an object of the senses of other men, and, generally speaking, but imperfectly understood by the man himself. In every age there have been many of the learned in common literature, and in all the other sciences, who have denied the very existence of mind as distinct from matter, or questioned its immortality, which virtually amounts to the same thing; and the unlearned in all ages have merely a verbal assent or belief of it, as they have of all other subjects which they do not understand.

Hence, by common observation, and also in the systems of zoölogical writers, Man is classified along with the other living creatures, and considered as differing from them in nothing save the organization of the body, and the results of that organization. Even the late Baron Cuvier, who is by far the most scientific of those classifiers, has made the description of Man in the system worse than that of Linnæus in some respects, though better in others. The improvement which he made was owing to his superior knowledge of the animal organization, and the purposes for which any particular structure is best adapted. In the extent and accuracy of his knowledge of these subjects, and also in the judgment and candor with which he applied this knowledge, he has hitherto had no equal. This accurate knowledge of comparative anatomy led Cuvier to separate Man from the apes and bats, with which Man had been classed by his illustrious predecessor; but the separation was made upon physical

grounds only, upon the fact that the structure of Man does not qualify him for climbing like the apes, or flying like the bats. Cuvier was an able and a candid philosopher; but still, he was only a material philosopher; and thus, while by his example he was giving very high and convincing proofs of mind, he took no notice of it in his precepts. It was this which led him to omit the distinctive character of Man, given with so much truth and effect by Linnæus —the fact of Man's being the only inhabitant of the earth that can be described as "knowing himself." We shall afterwards see that this definition, or distinctive character, short as it is, is quite sufficient; for the knowledge of ourselves is the foundation of all our knowledge: and it begins with that of the body; the use, or even the existence of any one of those parts of it which are afterwards to be used in knowing and acting upon the subjects of the external world, not being known until the knowledge of it has been acquired by experience, the labor of which is far greater than they who have not studied the matter would be apt to suppose, inasmuch as the first efforts—which are of necessity the most laborious ones—not only escape the observation of others, but are not remembered by the party himself. Our sensations are the teachers in these cases, and in all cases in which we acquire knowledge for ourselves: but the mind is the pupil, or recipient of the instruction. When a child burns its finger at the flame of a candle, the *finger* is not taught to avoid the candle; for if the candle is again brought into contact with it, and concealed from

the child's observation at the same time, there is no more effort made to avoid the candle until the feeling becomes painful, in the second or any future repetition of the experiment, than there was in the first; and the result is the same, at what period soever of after-life the experiment is made.

This may be verified by any one: indeed, all must assent to it without verification; and the same holds in the case of every other sense. The eye never turns away from an offensive light, the ear from an offensive sound, or the nostril from an offensive odor, until the offensiveness of it is actually felt. But, if there were any knowledge in sensation, surely we should find it in the organs of sense; for if not, then it would follow that a material organ, which is specially adapted to a particular office or function, has to be schooled in that by another organ specially adapted for a different purpose, and not at all adapted for that one—in other words, that all sentient beings act upon the absurdity so happily ridiculed by the satirist, in the case of the

> "Rosicrusian virtuosos,
> Who see with ears, and hear with noses."

But if the single material organ is incapable of knowing the object of that very sensation for the purpose of which it is obviously made, it follows that no combination of such organ, let it be as complicated as it may, can have this power, which belongs to none of the parts singly. The compound may, and no doubt does, in this as in many other matters, blind and bewilder those who are incapable of analysing

it; but it can do nothing towards making falsehood truth, or absurdity reason. One falsehood is not the less so from there being fifty others named and considered along with it; and as little is an absurd opinion rendered one iota the more rational by being maintained by fifty people; but the errors and absurdities of reasoning are concealed from being lumped together in masses, just as the follies and crimes of mankind are hidden by the numbers engaged in the perpetration of them. So powerful an effect has this conglomeration of absurdity—this hiding of one error in the shadow of another, upon the understandings of men, that in all intricate cases the minority are far more frequently in the right than the majority.

It is so in the case of the alleged knowledge of the animals. The philosophical truth is as plain and palpable, even to any one who will exercise but a little, and a very little, thought, as a truth can possibly be; and yet there is probably not one man in a thousand who does not believe the opposite. This, too, not among the illiterate and those who are untutored in the schools, but among those who are the most cunning in beasts, who take the highest places in zoölogical societies, speak with the greatest confidence at those more general institutions, which great names have devised for their own glorification, and whose crude and most unphilosophical writings are in the hands of every body who reads upon such subjects.

What we have hinted at is the chief reason of this. We observe Man only as an object of the senses, just as we observe the other animals. Like these, Man is

born and dies; like them, he has a definite organization and specific organs of sense; and in these respects there is a certain resemblance between the human body and the bodies of other animals which are vertebrated, or have back-bones and an internal skeleton. This resemblance is faint and shadowy in the fishes, especially in the sharks, the skate, and others which have the internal skeleton soft and cartilaginous, and the hard matter of the bones variously disposed on the surface of the skin, thereby indicating an approach to the crusted and shelled animals, which have few or no internal bones. In the reptiles it is a little closer, though the true serpents have the horny scales upon the body, serving in part as the skeleton, in their motions from place to place. The birds come still nearer in their general structure, though they differ more in certain parts of it, as for instance, in having no teeth. The mammalia come yet nearer to the organization of man, though there are very great differences among them: some of the handed animals, as for instance, the chimpanzee of Africa, and the oran-outan of the Oriental Archipelago, have so many resemblances to Man, both in their anatomical structure and their appearance, that they have, as we said, been classed with Man by naturalists, and are so regarded by vulgar observers of all ranks of society. The fact that Cuvier, who sticks to his physical distinctions, and never calls in the aid of the intellectual argument, having separated Man from the apes, is conclusive as to the structural part of the subject. But the structural comparison of Man with the other

animals is of sufficient importance for being treated of in a separate chapter.

Besides this similarity in organization, and the possession of localised senses, there are other similarities apparent to common observation between Man and the other mammalia: they perform certain functions by means of their organization, and they also perform certain external actions, in which the senses appear to be the guides in the case of Man as well as in that of the rest. Let this be admitted, and let us consider what follows:—

In all those functions of the body, the performance of which is not preceded by an impression upon any particular sense, the senses can acquire no direct information, though deranged states of these functions are far more immediately painful to the body than any thing of which we can be informed through the medium of the senses. Respiration is palpable to sense, it is the means of voice, and it is intimately connected with the senses of smelling and tasting, so that it is scarcely possible that the fact of its being carried on could remain unknown. A certain command over it is also necessary, both for the alterations of speech and silence, and for the various inflexions and modulations of the former. But, though the fact of the suspension of respiration being speedily followed by that of all the functions of life in the body, has been well known from the earliest periods of human history, yet the use of it in the system is of recent discovery, is still imperfectly known, and could never have been arrived at without many examinations of

facts and trains of intellectual operation, in which sensation could not have had the least concern, farther than in merely giving notice of the facts upon which those intellectual trains and the conclusions to which they led were founded.

Of the other vital functions of the body, which are certainly not less essential to its existence than respiration, the senses can take still less cognizance, or rather no direct cognizance at all; and it may be said that the only feeling which we have of them, is a feeling of buoyancy and vigor when they are all in a regular and healthy state, and a feeling of uneasiness when any of them is deranged. Indeed, so vague are these feelings that we are, in most cases of disease, incapable of ascertaining which of these systems is out of order; and not only are we ourselves in doubt, or rather in complete ignorance upon this subject, but the utmost skill of those who make the structure, functions, and states of the body, the constant subjects of the most careful observation and the most profound thought, are very frequently so much at a loss to find out what is the matter, that they have to cloak their ignorance under the disguise of a technical phraseology, which gains credit for being profound, simply on account of its being so thoroughly deep that it has no bottom of sense whatsoever.

The process of assimilation, by means of which the food is changed into a substance fit for the nourishment of the body, is still very imperfectly understood, in almost every stage of its progress; and even after it has passed through the whole system of

the alimentary organs, from the mouth to the thoracic duct, by which the chyle is delivered into the general system of the blood, we cannot say that it is yet fit for the purposes of the body, until the veins have carried it to the heart, that has sent it to the lungs to undergo whatever change it undergoes in respiration, the lungs have returned it back to the heart, and that has sent it over the body by the systematic arteries. Of all the parts and stages of this most complicated and curious process, sensation knows nothing, save the painful feeling produced by the derangement of any part of it; and even in that simple case, we have no certainty where, or in what, the derangement consists; for in some of our most annoying diseases, the seats of them are not only hidden to sensation, but we neither know of ourselves, nor can any one satisfactorily tell us, in what and how we are afflicted. Even the simple fact that the blood does circulate is a recent discovery; and as to most of the operations which are performed by it in the course of the circulation, we are completely in the dark.

It is the same with every other internal system, with the lymphatics and the nerves for instance. As to the former, we know little of what they administer, or what they absorb; and as to the nerves, we are probably in much deeper darkness than upon any other part of the system; for in all likelihood we are in a darkness of our own making, as well as in that which belongs to the very abstruse nature of the subject.

It is true there are not wanting those who attribute

to the brain, not only all the sensations of which the body is capable, but all the varied dispositions of the mind, the indications of which they profess to discover in the peculiar form of the cranium. Now, as we do not actually know the functions of the brain and its nervous continuations, we cannot of course decide what particular form of brain may be best for the performance of those functions. But we perceive that in all those organs of the body which have external functions to perform, and which we can actually compare with their performances, we find that there is a certain form of the organ which is the best adapted to the performance of the functions. Thus, a hand and arm which have the muscles firm and powerful, are capable not only of harder work than those which are feeble and delicate, but they are also far more nice and certain in the performance of the most delicate operation than hands and arms which are to appearance far more delicate. Thus, for instance, if we make allowance for the difference of sensibility in the cuticle, and that is perhaps less than we are apt to suppose—at least in any thing save mere endurance of changes of temperature, the hand of a ploughman is, in truth, a much more delicate instrument than that of a lord, and the hand of a milkmaid, if trained, is naturally fitted for nicer work than that of the first lady in the land.

Now, if there is a certain form and state of these organs of which we can see the operation, which is better for their appropriate function than any other form and state; and if considerable developement in

size, and more especially a firm and healthy consistency, be found to be favorable in those cases which we can observe, we may at least presume that the analogy holds in those cases which are not open to our observation. Thus, our conclusion from the analogy would naturally be, that a brain which is rather large and of a firm texture should perform its functions, whatever those functions may be, in a more efficient manner than one which is small and flaccid. But of course this must be taken with limitations—because excess of size may be a burden, and excess of rigidity a restraint upon action.

We do not, as has been hinted, know the proper functions of the brain and nervous system, even in a merely physical sense of the word; and thus, instead of knowing in what manner and to what extent peculiar formations of brain may influence the mental dispositions of those who possess them, we do not even know their influence upon the body. No doubt the skulls of a considerable number of subjects, both living and dead, have been examined by the professors of Phrenology; but, even granting that none of these have been made *ex post facto*, so that the parties went in search of that which they knew they could find, or in support of hypotheses previously formed of which they sought proofs, the number examined is so small a fraction of the whole human race, that they cannot philosophically be received as proofs of a theory of the formal modifications of a part of the body, the substantive use of which is not known. That the brain is a most important part of the system, we very readily in-

fer from the fact of its being more protected from injury than any other part, and from disease and death being produced by concussions of it, which could be suffered in any other part without danger. It is also true that the more sensitive any part of the system is, the more abundantly is it supplied with nerves; but we do not know that there is any kind of circulation in the nervous system, nor can we tell whether sensation or secretion is its leading function, and at all events no man ever came to any accurate knowledge of his own propensities by examining the phrenological characters of his cranium: nor has he any need, for there are much more direct and certain ways of getting at this kind of knowledge—indeed, it is of such a nature that we cannot hide it from ourselves if we would.

We may, in passing, remark, that the name Phrenology is arrogant and improper, as it takes for granted the chief matter in dispute, the fact of the shape and developement of the brain indicating *mental* dispositions, or speaking "the voice of the mind," which is the literal meaning. The original names, Craniology and Cranioscopy, were not liable to this objection; but they confined the subject to bumps on the skull, which not unfrequently answer to depressions of the brain, as a thickening of the cellular septum often pushes one table as far in as it pushes the other out. If it were worth while to be precise in language upon a subject which in itself has so little precision, *Encephalology* would unquestionably be the most appropriate term, and the least liable to objection of any kind, because it simply means the voice that is given

out by, or can be gleamed from, the *encephalon*, or contents of the skull, without any allusion to *phrenos*, the mind: and that it has or has not such an allusion is a matter of inference, and not of fact—a process of the mind itself, in which sensation has no farther concern than that of merely supplying the materials; and the present state of the facts is by far too imperfect for giving philosophical certainty to such an inference.

But, though the doctrines of phrenology are thus uncertain, they by no means deserve those anathemas on the score of materialism, which some zealots, equally ignorant as the harmless men of skulls, and far more intemperate, unphilosophic, and unchristian, have hurled against the doctrine, which, saving a slight leaning towards the nonsensical, is really one of the most innocent of amusements; and, certes, there are many persons within the four seas, and some of them of sounding name and lofty pretensions, who would be much more harmlessly employed in disporting themselves with groping the bumps on each other's pates, than they are in their present avocations.

Grant that all which the phrenologists contend for were established with the same force of evidence as a mathematical proposition—that the connexion between the encephalic developement and the mental propensity were as clearly established as the fact of heaviness is with lead; and it would no more affect the immateriality or immortal duration of the mind, than would a similar establishment of lameness with a poet, or a certain terrestrial repulsion of the heels in a dancing-master.

For every disposition of the mind, so far as the mind can be known to us, is an acquired disposition, and acquired through the medium of the body, and that only. The body is the teacher of the mind, or, to speak more correctly, it is the purveyor which furnishes the mind with all the materials of thought, whether respecting our brethren of mankind, the rest of the external world, or the matter and state of our own bodies; and the mind has no alternative, but must just receive whatever information this body gives it, modified by whatever humor or state, with regard either to health or feeling, or condition the body may be in at the time. The bodily appetites and passions, those which the merely animal part of Man partakes of in common with the other animals, cannot, for instance, have their origin in the mind; but if the body is under the strong influence of any passion, be it what it may, this passion will not only tint with its own colors all the information which the mind gets while the body is laboring under it, but it will communicate itself, and, if the expression may be admitted, it will press the mind into its service. Hence it is obvious that if the body is habitually under the influence of any appetite or passion, the suggestions of the mind must run more upon subjects connected with that appetite or passion than upon any others, just as the thoughts of men run upon, and their minds appear to be modelled by, the professions they follow, the company they keep, and the general tenor of their physical lives.

Thus, if it were well established that the bodily

passions and appetites are intimately connected with any particular formations or developements of the brain, or any other part of the organic structure, it must follow that these formations or developements would be indices alike to the body and the mind; and thus far, a system of phrenology might be quite rational, and not have the slightest tendency to materialism, or the casting of doubt upon the immortality of the mind; and that therefore it would be just as compatible with morals and religion as any other of the natural sciences. But still, it is to be borne in mind, that the science here, as well as in every thing else, is founded upon relations, which are mental subjects at which we never can arrive by the mere perceptions of sense; and that it is by means of these relations only that it becomes knowledge.

We have gone at some length into the details of this—the ignorance of the senses—the merely physical parts of our compound nature, respecting even the most immediately important of our vital and sentient organs and their functions, for the purpose of showing that though the body can and does communicate information, which the mind elaborates into knowledge, yet, that the body itself does not know the information which it communicates, the subject from which it receives its impressions, or the organization by means of which those impressions are either received or communicated to the mind. In so far as the body is concerned, the feeling may be pleasurable or painful, and must indeed be the one or the other; but beyond this it has no existence. It is not anticipated before it actually

takes place in the physical impression upon the sentient part, and it remains not after the physical contact is at an end. Nay, if it is not pleasurable or painful it is not felt at all; and many have received severe wounds in the heat and excitement of battle, of which they have not been aware till admonished by the flowing blood, or by some other circumstance.

This ought to satisfy the most determined sticklers for the possession of knowledge by the animals; for surely, if the human body, which they all allow stands foremost in the rank of organization, cannot possess knowledge,—even the knowledge of its own organs or its own existence, they would never claim a higher kind (for it is more than a degree) of capacities for beings which by their own admission are inferior. Yet, clear as is the demonstration, there is, perhaps, not one in a hundred who would not reject it as an absurd paradox; and such being the case, we need not wonder that the great body of mankind are duped into the belief of every absurdity which is so skilfully wrapt up in the mazes of language as that nothing glaringly false appears in it.

If we say in as many words, that the dog, which expresses delight at hearing the sound of its master's foot, which perchance greets him with a more kindly welcome than any of the human inmates of his dwelling, and which can follow after him for many miles, and find him out in a crowd of thousands, not only does not know that it has any master, but actually has no knowledge of its own existence, or of any one object in that system of nature of which it forms a

part, we are liable to be disbelieved. Yet this is not only the fact, but it is a fact of which if we have not, not merely the faith but the demonstrative conviction, our confidence in the doctrine of immortality is shaken to its very base: and all the doctrines of morality and religion are at the mercy of the winds—our morality is imposture, our religion is hypocrisy. If this animal, which has its day, and wholly returns to the dust, has the faculty of acquiring knowledge, what an unnecessary waste of Almighty power, what a monstrous contradiction of Infinite wisdom would it be, to confer an immortal spirit upon Man, when a dog can do all that this spirit can do, without any thing but his mere animal organization, and do it with less teaching and more certainty than Man can possibly do! Has the Almighty Creator, through the whole of whose other works there runs such a beautiful adaptation of means to end, that every thing is done in the easiest and best manner, with the least expenditure both of materials and of power, and invariably for the good of the whole system jointly with that of the individual,—has he failed in the case of Man,—has the Creator of the heavens and the earth been found incapable of so forming a rational and immortal spirit as that it can be any benefit to its possessor which he could not have enjoyed without it, by means of his body, like the other animals?

If this does not satisfy those religious persons who round the periods in which they essay to set forth the power, wisdom, and goodness of God, with flourishes about the knowledge and sagacity of animals, it ought

at all events to silence them till they have gone to school, and learned not by ill-judged ascriptions of praise to bring the very being of their Maker into question. But it is doubtful whether it will have even this effect; for there is no mode of darkness which so stubbornly resists the light of truth, as ignorance when it puts on the mantle of religious phraseology. Therefore, reserving the comparison of physical Man with the animals to another chapter, we shall add a few words upon another view of the matter.

It was D'Alembert, we believe, who so happily ridiculed that doctrine of "free-will" in Man, which has given occasion to so many idle disputations, and been made always the darker the more that has been said concerning it—it was he, we believe, who said that "if a stone *knew* that it were falling to the ground, it would *believe* that it fell of its own free-will, and not in consequence of the law of gravitation:" and in like manner we may say, that if the animals knew that they possessed the physical powers that they possess, or even knew the fact of their own existence, we should never bind a horse to the draught, or drive a bullock to the slaughter. It is the fact of our being capable of acquiring knowledge, and their not being capable of it, which gives us that power over them, while we have neither strength nor sensation in our bodies capable of procuring for us.

It is true that animals, within those particular ranges to which their organization and purpose in nature confine them, do many things which we could

not do without knowledge, and not a few that would baffle and defeat us in spite of all the knowledge which we can possibly acquire. All the schools and colleges in the world could not, for instance, teach a man to follow upon the slot like a bloodhound, or to find game and stand at it like a pointer: and yet there have been instances in which a pig has been trained to perform the latter operation; and a pig, like a dog, is an animal which, in a state of nature—the only state in which we can form a proper judgment of animals—finds the greater part of its food by the scent. We could not, by possibility, make a honeycomb, even if we had the organ of constructiveness developed to such a degree as would delight all the phrenologists upon earth; we could not collect the materials from the same sources, and put them together in the same way that the bee does; nor could we, with all our science, make a nicer application of the principle of obtaining the greatest accommodation and strength out of the smallest space and quantity of materials. But, still, it would be absurd to say that the bee has the slightest knowledge in the matter: she does not go to school—she goes instantly to her work, as soon as she has undergone her transformation, and is able to fly; and, instead of giving herself any trouble about the solution of questions of *maxima* and *minima*, she never begs one of Euclid's postulates, or tries her powers at crossing the *pons asinorum*. It is the same throughout the whole range of animated nature: the creatures have no knowledge, no use for it, and no means of acquiring it. They are

fitted for certain offices in the grand system of creation; and one generation of them, however brief may be the term of its duration, is just as fit as another. Perfect at once, they never improve, neither have they in themselves any principles or means of improvement.

"But Man can improve very many of them, so as to make them better fitted for his purposes; and probably there is not one among them which he could not improve, if he were to adopt the proper means." So he can, and so it is probable; and he can not only train and improve the animals so as to make them more subservient to his purposes, but he can do the same with vegetables, and with dead matter, in which last there is certainly no knowledge. The iron, while yet in the mine, surely does not know that it is some day to become the blade of a razor, and thereafter to shave a philosopher? and the lead which is crystallized with sulphur in the state of galena, even in those rich mines of North Wales, in which lead has freedom to converse with lead by hundred-weights and tons, has no science that it shall some day shoot a partridge or a woodcock?

You may say that these suppositions are absurd, and we at once admit that you are in the right; and we further admit that we have alluded to them for the sake of the absurdity. But let us proceed upwards, and we shall probably find that there is not less absurdity in your ascribing knowledge even to your most favorite animal. Take a vegetable,—and vegetables are far more plastic to the cultivating hand of

Man than even the most tractable of the animals. When the potato was first brought from the mountains of America, was it aware that it would one day form so large a portion of the food of Europeans, or banish famine from so many lands? Was the wild colwort, when first found on the strand, conscious that it was to become the broccoli, the cauliflower, and fifty other varieties, all as true to their successions, with proper care on the part of the cultivator, as the wild plant in its native locality? When the dahlia was first introduced into this country, a paltry flower with a single row of small petals, and not superior in beauty to the common marigold, which is such a nuisance in the corn-fields of some of the poorer parts of the country, what knowledge had it that it was so speedily to become the greatest beauty and the most easily cultivated of all our autumnal flowers, the boast of the professional florist, and the ornament of the little patch of ground by the cottage of every tasteful peasant in the country? In all these cases, and in a thousand others which we could as easily cite, you will of course answer that the plant had not the slightest pretension to the knowledge of what it was to become, or in any way to the knowledge even that it existed; but that the whole of the changes, even in those cases in which they have been most remarkable, or most wonderful, if the expression is preferred, the whole of the knowledge which has produced these changes has been the knowledge of man, and not a jot on the part of the plant.

Admit that it is so,—as who can refuse the admission?

—and yet who shall say that there is one tittle of man's *invention* in the whole matter? It is all the result of *discovery*, and of discovery step by step, of which man was, at the outset, just as ignorant as the plant; and it is only changing the organization and the habit and use in wild nature, to bring the same argument home to the case of every animal upon which man has tried his skill, be the animal, and the change which has been effected upon it, what they may. Nor does the matter, by any means, stop here: for if we make allowance for their structure, organization, and place in the system of nature, the plants, even in what we regard as the very humblest of their species, are every way as perfect to their purpose, and as wonderful to us, as the animals. They have not, it is true, the capacity of locomotion, excepting in the distribution of the seeds or germs of many of them; and in this particular habit of their being, or portion of their economy, they are even more wonderful than the animals; and yet the merest dotard in such matters never thinks of attributing to them the slightest degree of knowledge as to what they are doing, or of the existence of any thing around them, or of themselves. We see frequent examples ourselves, and we read of many more wonderful ones, of the efforts made by the roots of plants for their stability, and for the purpose of reaching the kind of soil which is fitted for affording them their proper nourishment. Nor are the efforts of the upper parts of plants to reach light, or any thing else which is favorable to their well-being, less wonderful. If a tree is planted by art or sown by nature, in a situ-

ation where it is more exposed to danger—such as being uprooted by the wind—on one side than on another, it in no instance fails to put forth its roots in that direction in which they shall afford it the greatest possible stability which can be afforded by the same exertion of growth. In like manner, we have many instances of the seed of a tree accidentally sown and vegetating upon a top of a ruin, sending down its roots along the wall for many feet, in order to reach the soil at the bottom; as well as of other roots insinuating themselves into the fissures of rocks, and moving tons of granite, in order to get at soil fit for affording them that nourishment which they draw from the ground. We have ourselves seen many instances of both of these, and especially of the latter, upon some immense masses of granite in the birch-woods near the seat of the late Macpherson, the translator and transmogrifier of the poems attributed to Ossian, the son of Fingal. The place is in Badenoch, in the upper valley of the Spey, and its name is Belvoir, or Bellevue, we forget which; but the name neither makes for nor against the fact. So also we have seen instances of a common potato, which would not have raised its stem above a foot or eighteen inches, if planted in the fields in free exposure to the air and light, climb more than forty feet in order to reach the single aperture in an old tower by which light was admitted; and as recently as last year (1837) a dahlia root, which we had forgotten in a dark cellar, had grown to the length of two or three feet in the direction of the bottom of the door, the only place at

which a glimmer of light was admitted into its prison-house.

Now, nobody would surely pretend to say, that in all or any one of these cases the plant had any knowledge of the situation, or even the existence, of that of which it went in quest in the most vigorous manner and by the most direct line; and yet the effect was more vigorous, and far more unerring, than if it had been founded upon experience. Of experience, however, neither of the plants could have had any; for a plant has not a school in which it can learn by experience that which it is to practise afterwards. The plant on the top of the ruin could not possibly know that there was good soil at the bottom; and as little could the birch on the top of the granite know either that it could heave the successive pieces of that rock asunder, by insinuating its root between them, or that, when it had once accomplished this laborious task, it would be repaid by a plentiful supply of nourishment from the soil which it would then have reached. Nor will it surely be alleged, that when the potato began to feel the return of the spring, and to grow in the rubbish at the bottom of the tower, it knew of the chink full forty feet above it, and at the opposite corner; and that, acting upon this knowledge, it clambered up with a length of stem unusual to the habit of its species, and suspended in the air by nothing but an anxious desire that it might reach the light, expand or flower, and in due time ripen seeds. This would be philoprogenitiveness with a vengeance; and if the fact of its being the result of knowledge could be

established, then it were well that the adepts in the art should cease to heed this bump on the human cranium, and study it in the far more energetic potato; and in this they would be as much in the way of philosophy as a certain most sapient committee of their members were in finding the organs of pugnacity and wit, "uncommonly developed," in a cast which some wicked wags had prepared from a model formed of a most dull and tranquil turnip.

But the wonderful working of nature, upon what would be with us called strictly geometrical principles, goes much further than this, with equal honesty and certainty, and under circumstances, in which the veriest dotard in the belief that the physical action of animals would not say that it proceeds upon knowledge. If matter, be it of what kind it may, merely aggregates, or "comes into a lump," from a state of dispersion, it always assumes the form of a perfect sphere; so that, upon the knowledge hypothesis, a globe is the primary form of matter; and there is not a single particle of created substance which has not a competent knowledge of this solid, and can take its place in it with far more ease and certainty than the best-drilled soldier can take his place in a solid square.

And if the matter is a little more knowing, so as to crystallize at the same time that it aggregates, it displays considerably more skill in geometry. In this way, water is peculiarly knowing; for it always sets off at an angle of sixty degrees, well aware, of course, that this is the angle of a solid of close occupancy, or perfect inhabitiveness. In these crystallizations, too,

the particles of the same kind—it signifies not whether, to our imperfect knowledge, they be simple or compound—have a most perfect knowledge of each other when they come within hailing distances; and they also know, with far more nicety than we do, the differences of heat and cold. Any salt—Glauber's salt (sulphate of soda), for instance, which is a very shrewd salt, and not only clever at crystallization, but really knows more of the cure of some diseases of the animal body than all the doctors of the faculty—any salt will illustrate this. If it is dispersed through a large quantity of water, so that the particles are not within call and answer of each other, they remain scattered; but if the water is diminished to such an extent as that they come within call, they are very speedily combined into crystals. Furthermore, when they get heated they remain sullenly apart, just as is the case with rational beings. Thus, boiling water disperses the particles of much more of this salt than cold water; so that if a boiling solution is poured into a wide-mouthed bottle, a piece of air-tight membrane tied over the top, and all left quietly to cool, the contents of the bottle will remain liquid; but if you now take a sharp-pointed knife or other instrument, and perforate the membrane, just touching the top of the solution with the point, crystallization will shoot through the liquid like a flash of light, and it will be a solid in an instant. It is farther to be observed that the greater number of compound substances take a certain quantity of water along with them in forming their crystallizations, and generally the more of it, the

more dissimilar that their ingredients are. Diamond, which, when colorless, is one pure substance (charcoal), and very little mixed when colored, is an exception. It contains not a particle of water, and yet it adheres more closely together than any other substance known.

It will surely not be said that there is knowledge in any one of these cases; and yet the operations are more nice, and the results more perfect, than any at which man can arrive, with all his knowledge and all his experience. It is the same throughout all nature, living and dead, animal and vegetable; and the animal functions of our own bodies, by means of which they grow, repair their wants, and carry on their whole economy for their appointed time; but there is not one iota of self-knowledge in this merely material creation, from the simplest mineral up to Man. They work according to laws which form the very essence of their being; and they can no more deviate from those laws than lead can of itself fly in the air, or tinder remain in the fire without being consumed.

Hence, all their operations are perfect to their natures; and Man cannot, even with all his mental knowledge, far less by the animal use of his hands, untrained by practice and unguided by thought, equal the most apparently simple of them. Knowledge given to them would spoil the whole natural symmetry and order of the system. If they had less power of acquiring it than Man possesses, they would generally go wrong, and if they had as much, it would not keep

them right. It does not keep Man always in the right, even in his own estimation, though he is seldom disposed to take an unfavorable view of himself; and if we had a little more knowledge, we should perhaps find that we are never quite right, but bunglers even in our most careful actions, in comparison with the rest of nature, where all goes on in strict accordance with the laws which God has appointed. We have proof of this in our own individual case; for if we knew the use of our faculties of observation and thought, and our means of action, and thus became wise in proportion as we grow old, there is no one action of our lives, even those for which the world may have applauded us the most, which we do not feel that we could do better, if we had it still to do.

If animals could, by possibility, have knowledge, would they not employ that knowledge in the way that man employs it, in the first and least-developed states of society? Would they not turn it to their aid in procuring a more abundant and easily-obtained supply of their grand necessary of life—food? And, once beginning and finding the advantage, would they not go on till we had foxes keeping poultry-yards, dogs tending their own flocks, and sheep leaving the labor of nibbling on the bare hill, and sowing turnips upon some sheltered spot? If their knowledge did not go thus far at least, *could* we call it knowledge—knowledge without a prostitution of the term? But, instead of this, the "sagacious" dog, unless man has trained him to follow particular objects, barks and

worries as readily at a barrow, while in motion, as at a pig: and attacks the wheels of the driving carriage even more readily than the heels of the horses.

We have gone at some length into this subject, because it is the vital one in the knowledge of ourselves—because it lies at the very foundation of morals and religion—because the great majority of mankind have mistaken notions respecting it—because the popular writers, almost to a man, write so as to propagate the error—and because the more skilful analysts have generally avoided it. For these reasons, we shall allow the reader to pause upon it as between chapter and chapter, before we notice the other two points.

CHAPTER IV.

MAN CAN HAVE NO KNOWLEDGE BUT WHAT HE ACQUIRES; AND NO MEANS OF ACQUIRING ORIGINAL KNOWLEDGE, EXCEPT HIS PHYSICAL POWERS OF OBSERVATION.

THE short logical demonstrations of both these propositions may be said to be given in the meaning of the word "knowledge," as explained in the beginning of the preceding chapter; but, as the right understanding of them is of some importance in showing the necessity of self-knowledge, and enforcing the necessity of its application; and as there are prejudices upon them both, scarcely less inveterate, though not quite so vital, as that which we have endeavored to expose, we enunciate them anew, and proceed to the illustration of them without farther introduction.

I. "Man can have no knowledge but what he acquires." Though this is almost a self-evident truth, or, at all events, is involved in the more general one that "Man can have nothing but what he acquires, save that which he gets from nature, which consists of his body and his mind, and nothing more;" yet

there have been many disputes and prejudices about it, and there is some rubbish to be cleared away, before the public can clearly see it, or benefit by it. Some may think that, in place of the words, "nothing more," in the general truth, as above stated, "the world for the winning" ought to be substituted; but though there is some truth in this, it is not absolutely true, and therefore it is inadmissible. Men of different countries have not the same power of viewing the world; for, upon the single subject of knowledge, the savage has little more at command, in point of time, than his own brief term of life, and little more, in point of space than his own limited horizon and its trifling changes. The civilised man, on the other hand, can avail himself of the experience of thousands of years, and of the whole extent of the earth, and of the heavens too, in so far as these are matter of science. But these are not given him as a free gift, like the bodily power of seeing or hearing, or the mental one of comparing, drawing conclusions, and acting upon them. He must receive them before he can use them; and it is this necessity which renders the knowledge of ourselves, and how we may turn this knowledge to proper account, so very important and indispensable. In this case, also, and more especially in that of professional meanings, the regulations of society—even the necessary regulations, without implying that there is the least injustice in them—very much diversify the means possessed or enjoyed by different individuals. Thus, for instance, one man comes into the world with nothing

binding upon him to do, but merely enjoy it, and such a man will sometimes spend his life as much like a mere animal as ever he can—that is, in the gratification of his bodily appetites; and another man comes into the world to toil, and learn, and use, and strain, to the very utmost, all his powers of body and of mind through the entire period of his strength, and then, in his decrepitude, feels obliged to take his living burial in a workhouse, unknown and uncared for, except by those who wish him dead, in order that the parish may be spared the expense of his pittance of food, and haply sell his bones for the reimbursement of a Christian and charitable public. But still, even in these extremes, we must not judge of appearances; for the man who is expiring on the straw may have carried through life "a conscience void of offence," while the barb of remorse may have been incessantly rankling in the other. Ay, and when the last moment comes—for the justice of Heaven knows no distinction between a poor-house and a palace—the hope of the hapless man may brighten, and the fervent joy may transport his passing spirit,—"Come, thou blessed of my Father!" while, it may be, that in the other case, amid all that wealth and attendance, and medical skill can give, the blackness of darkness may be upon the mind, and the fearful sounds may, ever and anon, come from it in muttered thunder,—"Depart from me, thou cursed!" and shake him with a fearfulness of anguish, compared to which the worst that the world can do would be peace and delight. Such power may the mind assume, for weal or

for woe, when it is putting off the mortal, and feeling its own independent and everlasting strength. But these are incidental matters only; and, though they come a little in our way, they are not essential to our main subject, which has reference to the early part of life rather than to its close.

The principal errors or prejudices, which raise doubts upon the subject of our total ignorance when we come into the world, and our perfect equality at that moment, are chiefly of an intellectual nature; and, therefore, though they are necessary to a proper understanding of our physical condition, we shall not require to go into them at any length. But they put us wrong in our physical knowledge of Man, by attributing to the mind, as original, certain differences between one man and another, which seem to be in great part acquired, or, if they at all depend on any original differences, then these are differences of the body, not of the mind.

The old absurdity of *innate ideas*—that is, certain portions of knowledge with which we are born—is now nearly forgotten in its direct form; and, indeed, one wonders why it could ever have been entertained, as one single step in the way of analysis reduces it to one of the most plain and palpable absurdities that can be expressed in words. If these "innate ideas" are to be of any use to us, they must relate to those subjects with which we are to be conversant in life, and surely they would be of the greatest use to us at the very commencement. Thus, an innate idea that fire would burn, or arsenic poison, would be of far

more use to a child than any metaphysical speculation could be to a philosopher; and yet, so far is the infant from displaying any sign of the possession of these ideas, that it attempts to seize, and convey to its mouth, the flame of the candle, in preference to any other object on the table; and, until taught otherwise, it would put arsenic in its mouth as soon as bread.

The young of other animals, which need no knowledge to guide them, never fall into these mistakes. By far the greater part of them in number come perfect from the egg, and of not a few there is not a single individual of the parent race in existence, at the time when the young are thus cast upon the world; but though they have thus neither precept nor example to assist them, they manage all their little matters with such perfect accordance to the law of their being, that the annual insects of this summer are so exactly like those of the last, both in their appearance and in what they do, that, to our observation, they are the very same. Those animals, which are of larger size, require more food, and have to labor more in the procuring of it, require nursing and feeding, varying in length of time with the species, but still following one common law—that the more severe the labor is to be, the longer is this nursing protracted. The calf begins to browse and the lamb to nibble in no long time after they are dropped; but the cubs of the wolf and the lion remain for some time helpless in the den, and are fed by the parent animals. It is the same with the birds: the partridges, and many of the other ground birds, which keep on

the wing but little, run about and pick up their food the moment that they are out of the shell, and even with part of it upon their bodies; the pigeons, which have to use the wing much, feed their young for some time from the stomach; and the birds of prey, and also the long-winged birds, which find their food, by severe labor, from the sea or the inland waters, are fed long and in large quantity. There is a difference in these aquatic birds which is worth attending to. The ducks and others which are swimmers, and require much use of the wing only upon their migrations, take the water soon after they are hatched; while those which are unable to feed themselves till they are full-fledged, remain in the nest till that is accomplished. That all these matters are of nature, and not of knowledge, is proved by the fact, that no scolding or wheedling of the hen under which the eggs have been hatched, will keep young ducklings out of the water, any more than the hatching of a young cuckoo under one of our resident birds, makes it forget the migratory habits of its life.

In the human subject we can trace none of those general habits by which animals, even in the artificial varieties or breeds, are distinguished from each other, any more than we find evidence of the existence of those innate ideas which were once matters of so very general belief. As these innate ideas were regarded as mental, as being such they must have been regarded as knowledge; and, as there can be no knowledge without a subject known, the absurdity to which the belief of innate ideas immediately leads is this:—"We

actually have knowledge of some subjects before we can possibly have it;" and if this is not an absurdity, it would be difficult to imagine words whereby an absurdity could be expressed. Or, as if in order to render the absurdity more glaring, the innate ideas were supposed to relate to the more abstruse subjects, at which we can arrive only by the most protracted trains of thought, while on plain matters, such as we might be supposed to stand most in need of before we had experience, we had not the help of a single adequate idea. It was thus that, what with one absurdity, what with another, the schoolmen made Man so bungling and ridiculous a piece of patchwork altogether, that we cease to wonder that men should have shunned the study of "Man" with aversion and scorn, as soon as their minds began to be enlightened upon other subjects. Now that which, from mistaken notions, was originally called an idea—a word which is so interwoven with our common speech that we cannot easily discard it, and therefore we must content ourselves with defining it,—an *idea* is nothing but a name for a particular state of the mind; and when we say that we "have an idea" of anything, we do not mean that we possess a certain mystical something, independent and in addition to ourselves and the subject of which we have the idea, but merely that our mind is in that state in which it knows or understands the subject, although that subject is not present to the senses at the time. This gives us another expression for the absurdity; for, according to this—which is the only rational meaning of the word idea—"An

innate idea is a state of the mind in which that mind must be before it begins to exist, in the only sense in which we can understand its existence."

The other prejudice is not much less absurd than this one, but the absurdity is concealed in a thicker conglomeration of words; and therefore it is more inveterate, and receives probably as general belief at the present day as it did at any former period. It is the doctrine of *original genius*,—as something in which the mind of one man differs from that of another, not only in general aptitude or capacity, but in regard of some particular subject or class of subjects, in preference to other subjects or classes: as, we say one man has a genius for mathematics, another for painting, a third for poetry, a fourth for music, and so on. In short, this same genius is quite a Proteus, and may be turned into any shape. Thus, the garrulous Frenchman, whose ordinary powers of colloquy had failed to have any effect in drawing words from the silent man, addressed his flattery to him in these words:—"Sir, you have a great genius for silence." Upon the same principle, to speak of "a genius" for uselessness, for folly, for vice, or for various other repulsive matters, would be just as correct as a genius for the more estimable habits of men, only the words in these cases are not in such good odor.

This genius sounds all very well when we leave it perfectly general, or keep it to the mere name of the habit; but when we come to particulars, it begins to put on an aspect somewhat different. If, instead of an original genius for poetry, we were to say that a

man had been composing songs, odes, or epics, before he began to exist, or instead of one for music, that he had had much of the same pre-existent practice on the fiddle, those to whom we addressed ourselves would have some difficulty in maintaining their gravity; and yet this is what we really do express every time that we speak of original genius, be the subject upon which that genius is displayed what it may.

The consideration of this as a matter of intellect, which it is usually, if not invariably, considered as being, belongs not to the present subject; but as there are, in all probability, some physical differences upon which the belief of this genius may be founded, it becomes a necessary, and far from an uninteresting, portion of the physics of man, inasmuch as it shows, that if we understand the body well, and teach and conduct it rightly, we shall not only reap the reward in a physical sense, but shall get the intellectual honor of possessing original genius into the bargain, as a bonus: we shall, in other words, get both a pension and a title.

Now, if we have been in the habit of attending to the variations of our own aptitudes for observation for thought or for action, and especially if the whip of necessity has been pretty constantly and smartly applied to us, though not to such an extent as to break us down, we must have found out that there were times at which we were incapable of observing, thinking, or acting to any efficient purpose; and this when there was no specific disease of the body, no occupation of the mind, and no reverse or vicissitude of the

world, by which we could account for it. At other times, we must have felt the buoyancy of the ready eye, the rapid thought, and the willing hand, come upon us when we were racked by disease, perplexed in thought, or hurt and annoyed by the cares of the world. But there is not the smallest doubt that all these changes are owing to different states of the body, in respect to that quick feeling which pervades all the parts of it, and which has no necessary reference to any one particular sense.

In such cases, we are accustomed to say that the mind is cast down or elevated; but such expressions are incorrect. Knowledge is the proper business and occupation of the mind, and therefore it never feels either the depression or the elevation, but from known causes—causes which are known by itself, whether the present object of the sense be such as would lead to this result or not. Thus, for instance, we may look at a beautiful picture, or a pleasant habitation, and thus far the impression upon the sense is such as should and generally does, conduce to our mental delight; but the mind may set the shaft of anguish on the string, and make us miserable by one little suggestion. That dwelling and that picture belonged to our dearest friend, with whom we spent our best and happiest days, but now he is mouldering in the dust. In like manner, if the mind can arouse itself, and pluck the arrow which the sense has planted, it always brings its relief in the form of a thought.

Thus, in these indeterminate cases of weal or of woe, in which we feel that all is out of order, and yet can-

not fix upon what really is the matter with us, we may be sure that the primary cause is in the body and not in the mind; and the mental part of the business arises from the body communicating intelligence to the mind that all is not right, without any hint as to what is wrong, and no suggestion arising in the mind to supply this information. People, in common speech, give a very appropriate name to this state, when they say, "they know not what is the matter." Skilful physicians are of great use to those of sensitive body in such circumstances; and the mere fact of one in whom they have faith giving a name to the disease, often takes away more than half the anguish, and ultimately and speedily effects a cure where all the prescriptions in the world would be of no avail. Quacks work upon the very same principle of our nature, only they work differently. No matter what the nostrum is, it gives hope for a moment; at the end of that moment another is wanted, and so on.

It is usual to describe these as mental cases; but, though the cure may be in a great measure mental, the origin of the disease is in the body, as also is the origin of those upliftings of "the spirits," as we say, for which the mind can assign no cause; and the ascribing of a mental origin to them has jumbled the proper affections of the body and the mind together, and darkened and distorted our knowledge of both.

Irritability of the bodily system will break through all reason in thought, and all propriety of action; and, on the other hand, dulness of the bodily system may, so to speak, beggar the mind for want of the mate-

rials of knowledge. The latter does not plague its possessor nearly so much as the former, but it renders him comparatively useless. The one does no good, and the other is often doing mischief. There are persons of such a habit of body as that these two are mixed, so that they are either in a torpor of indolence or a storm of passion. These are the greatest afflictions to those connected with them that are to be found in human society. They are like the powerful beasts of prey, always dozing, except when they are roaring and rending.

The body may have every shade of this varying habit, from the happy limit of a body of uniform tone, which never invades the mind with any of its more turbulent passions, and thus leaves it free to think upon all subjects as they pass, to that wretched and worthless constitution of storms which we have attempted to describe. These differences, even including melancholy and mania, in all the forms and degrees usually termed mental derangement, are wholly of the body in their origin, and their causes may be very varied. This may be brought on by treatment, it may be acquired by habit, or it may be hereditary—that is, it may be in the original constitution or balance of the several parts of the body; but whether it arise from any or from several of these, or from many other circumstances which act upon the body without their specific action being at all understood, it seems to offer the most satisfactory explanation of what is popularly called the possession or the want of original genius; though the subject requires consideration also

upon intellectual grounds, if it were only on account of the fact that the popular reference of such differences is always to the mind. As this has been the sense in which it has been usually received, the word genius has been supposed to mean not only that fertility of the mind in the acquiring and common application of knowledge, which is the result of a tranquil body and steady and persevering attention, but a certain aptitude and success in working the elements of even a more limited store of knowledge than that which persons without genius possess, into new and striking combinations, which make more impression upon other parties than matters of more real value presented in a simple form. In short, the efforts of genius are understood to tend more to the delight of the world than to its instruction, except in so far as the charm with which it is invested by genius may attract attention to a subject, when that subject has not much to win the attention in its simple truth.

In this sense, genius is unquestionably an intellectual matter, and one of the highest to which our attention can be directed, both for our own sakes and for those of others; for it involves the solution of this problem:—How shall we bring before the public, with the greatest effect, that which we wish to do? But, in this elevated sense, it comes into action after the knowledge is acquired, and therefore it is doubtful how far it may be regarded as *original* genius, in any sense of the word, and more especially when we consider the very beginning of knowledge—the point at which we must start, if we are to have any thing

like a proper understanding either of ourselves or of others.

That even at this most elementary stage—at the very moment when the infant begins to have the slightest shadowy and indistinct feeling of its own existence—constitutional differences in the *body*, both of hereditary descent and of the individual, may make one infant much more quick than another, both to primary bodily sensations, and in the communication of these sensations to the mind, is not only probable, but exceedingly likely—indeed, we may say certain, without much fear of error. But of mental differences we can say nothing, until the mind is in possession of so much knowledge as that we can institute a comparison of its extent and effects; and before the child can furnish us with any thing sufficient for this purpose, its self-education must have advanced a considerable way, and the principle bent of its intellectual character has been, in all probability, determined for life. This far we know, with as much certainty as can be obtained upon such a subject,—that children of great sensitiveness and much irritability, are most active and observant in their extreme youth; but it is doubtful whether this be, upon the whole, an advantage, and we are sure that an excess of it is not. Their frames are yet all too tender for being able to endure, at the same time, their rapid growth and a high degree of this sensibility, even though precocity of mental developement should be one of its consequences; for very quick and sensitive infants are the most apt to go off in convulsions; and, even if they

escape these, they have not the same stamina and permanence as others which are of more tranquil temperament. Their lives are in general shorter, even with all the care that can be bestowed upon them; and that mysterious connexion between the body and the mind, which is the most delicate as well as the most incomprehensible portion of the whole compound nature of man, gets worn out, and their powers begin to decay, before the ordinary period. Of course, there is evil in the opposite extreme also; and a constitution of extreme sluggishness and inactivity is not only of inferior value while it lasts, but has the numerical tale of its days shortened, and becomes extinct to the world from sheer inanity. But these are only modifications of the way and the rate in which knowledge is at first acquired, and not any portion of the knowledge itself: and though the aptitude of the recipient is a consideration of no mean importance itself, yet its importance can only have value by its being put in requisition.

These hints—which carry the matter as far as it can well be carried without entering formally upon the intellectual view of it, which would be inconsistent with this volume—may suffice to show those who will examine them with attention, and without prejudice, that we begin life in utter ignorance as regards both the body and the mind; and that, whatever differences of aptitude for the commencement of knowledge and action there may be, are to be referred to the body only, and in nowise to the mind, as we know nothing, and therefore can predicate nothing of it, until it

furnish us with data in the knowledge which it has actually acquired. Our own mental feelings, and the whole of our experiences, which are of such help to us in the sudy of Man in after-life, avail us nothing here; for not a hint of them returns to our minds by any future suggestion,—nor can we ever imagine what would need to happen to a full-grown man to bring back to memory the circumstances under which he was when he first felt that he was a being susceptible of simple pain or its absence. The pleasurable feeling is probably later in coming, though it also is before the state of memory. The first curl of a smile, which is hardly perceptible upon the little lip, is in all probability the indication that another human being has, for the first time, tasted the sweet of the cup of life. This conclusion brings us to our second proposition.

II. "We have no means of acquiring ORIGINAL knowledge, except our physical perceptions." We here make use of the word "perceptions," merely as a general name for all the impressions made upon the sentient susceptibility of the body, outwardly or inwardly, and whether by senses localised to organs, or exercised in any other way,—every impression upon the body, in short, that could by possibility be communicated by the body to the mind, whether it may in every instance be so communicated or not.

In this, also, we are upon somewhat slippery ground, and we have to contend with prejudices, which, although not so vital or so general as those that have been already noticed, are probably entertained by

those who are less capable of any thing like rational argument, and therefore, more inveterate than the others,—parties who have a short way of settling disputed points, by giving to the Devil all who presume to differ from them. But as we have doubts whether, though there may for aught we know be a good understanding between the parties, the said personage is disposed to accept all gifts thus given him, we have no fear of the malediction before our eyes.

We have introduced the limiting term "original," into the enunciation of this truth, and marked it as emphatic, in order to steer clear of misrepresentation as well as error. There is much knowledge, and that by far the most valuable we can possess and act upon, which is mental in its very origin; but still, it could not originate, if it were not for the bodily perception, how much soever it may depart from or soar above the very humble nature of that. Indeed, nothing that the senses do, or can, communicate, is knowledge in the proper sense of the term, until the act of the mind has passed upon it, and compared one part of it with another, and perceived the relations between them.

There are also various subjects from which an inquiring mind, well stored with knowledge, cannot be restrained, and from which it were pity that it should be restrained, which overleap the boundaries of that cautious philosophy which is ready at all times to verify its steps by a cross-appeal to the senses. But these airy regions are those in which the fires of genius are lit up, and the wings of fancy are feathered. They

turn the cold reality of mortal life into a paradise of intellectual delight, and give us, even while we are in the body, joys which the world can neither give nor take away; and therefore, the power of launching freely and fully into them, is one of the choicest gifts of our bountiful Father.

But even in them we must have our beginnings in the sense; and in this beginning, He has himself set us the example, on the only subject upon which we could have obtained no certain knowledge without the aid of a direct revelation. To those who may be disposed to question the necessity of revelation, and say that there is enough to be read in the book of nature to give us correct knowledge in these matters, we only say, that the very wisest men and nations made strangely inconsistent work of it without this heavenly aid; and that though, with the light of revelation to let us see them, the characters in the book of nature are most legible, and its lessons delightful, yet mankind were, somehow or other, quite unable to read them in the dark.

But the evidence, even in this case, is addressed to us as men in the body, in the very same way as the evidence of any historical fact; and, were it not that this external evidence is such as must be sustained in any court of justice, or by any judgment of ordinary reason, we say it with deference, but we do say it, that the whole of the internal evidence, which comes with such delightful effect when the understanding has been once satisfied by the other, would not be worth one single rush without it.

This is the delicate ground to which we have alluded,—the ground upon which we meet with those who can condemn though they are unable to judge; but it is ground which must be traversed if we are to carry our analysis boldly and manfully on to the truth. All special conversions, and all spiritual experiences, which cannot be resolved into elements explainable upon the ordinary reasoning, and brought to the very same kind of proof which revelation itself is so triumphantly able to abide, are either the dreams of ignorant and distempered imaginations, or they are instances of gross imposture, knowingly fabricated for the very worst of purposes—that of cheating the ignorant and credulous out of their understandings, for the lucre of worldly gain. The message to all mankind upon this subject is perfect, and fully adequate to every case in which it can be necessary; and, therefore, the mere assertion of such particular experiences is as gratuitously absurd, as it is grossly impious. Men may have new and much more delightful feelings upon those subjects, as they have upon all subjects upon which the light of truth limns the radiant trace of hope in the dense and pitchy cloud of ignorance and uncertainty; but if the feelings are genuine, the parties always will, as they are personal matters in which the world has no concern, give God thanks in private, say nothing, and prove their sincerity and gratitude by deeds. With these few words we dismiss such subjects, not again to allude to them; and proceed to those respecting which there are no such grounds of offence.

All knowledge being either strictly that of the material world, or founded upon evidence for the truth of the elements of which an appeal lies to that world—and the philosophical proof of the existence of our own minds must stand the test of this evidence, and does stand it,—there are really no means by which we ever imagine it to be communicated to the mind, but the body. What resources the disembodied mind may hereafter have, has nothing to do with the matter, and though it had, we have no data that could be of any avail concerning it. However, in the present world, to the inhabitants of which, and to them only our remarks can be addressed, we have to deal with minds in conjunction with bodies, and we must address ourselves to them through the medium of those bodies; so that supposing, for the sake of argument, that such pages as these do contain information, it finds its way to the mind of the reader through the medium of his eyes; and, in order that it may have a fair chance of reaching its destination within, and producing its effect there, we must endeavor to win the favorable opinion of the porter that keeps the entrance to the inward man, and admits or rejects according as he is affected.

Even this forms no unimportent part of the knowledge of ourselves, that is, of human nature; for language is the means by which we both lead mankind and are led by them; and thus, how to make this language produce its effect in a manly way, and without deceit and self-degradation, is no mean point gained. In mere addresses of etiquette, those or-

dinary conversations into which we enter, and in which we have hardly any end or motive beyond the showing of our quality and the killing of that time which otherwise would hang heavy on our hands, we are very apt to be estimated in the same way as people estimate the quality of their morning visiters—by the loudness of our knocks; and this mode of deciding goes much farther than many would suppose, probably because it can be applied without any labor of judging. In physical begging, "the bold beggar gets the big alms;" and it is much the same in all beggings, whatever may be their real or occult object: if our address is to win or even reach the mind, it much first of all please the sense; and there is not much difference whether it is addressed to the ear or the eye. Among reading people, there is such sympathy between these,—so much tendency to produce the same mental feeling, that the very same style is applicable alike to the ear and the eye. In a spoken address, indeed, we have a double advantage, or its opposite. If we please, we gratify two senses, and they jointly become our messengers to the mind; and if we are indifferent or offend, we have two against us. The appearance, the gesture, and the expression, have an eloquence in them, even before a word is spoken; and then, the easy flow, and the mellifluous cadence of the words, have very often tenfold the power of the sense. It is well for the credit and the name of most public orators that they are so; for the most captivating and effective orations, when we bring the cold scalpel of logical analysis to bear upon them, are

almost invariably found to have the most feeble, ricketty, and disjointed skeletons. And it may be well that it is so; for all mankind can be captivated by the eyes, or carried away by the ears; but it is only one here and there who is charmed by the intellectual part of the matter, or will even listen to it. If the instrument and the performer are both superior, the whole congregation thrill at the sound of the organ; but unless the preacher has the art of throwing in enough of garnish, the probability is that many speculate, some get impatient to be gone, and a few are overcome with sleep during the sermon.

Any one who chooses to submit to the trouble of a very little observation, may verify these remarks by an appeal to the facts; and we have made them not for any censorious purpose, but because they make strongly for our position, that the senses are the only inlets of knowledge. It is with the beginnings of knowledge in the infant that we ought to deal; but there we have no direct proof, as the party cannot inform us, and the indications are not intelligible to an ordinary observer. Therefore we must have recourse to analogies, as we must do in all cases where we cannot get directly at the result upon its own evidence; and analogies drawn from human conduct are always most valuable when taken from those cases in which the parties fancy that they are not acting any part, or giving foundation for any analogy whatever.

Now, even adults, who have had the advantage of experience, can—excepting in some rare instances

depending upon habits of the parties—be effectively addressed through the medium of the senses only, it must follow that in that early stage, in which there can be no direct address, but when the party must find out for itself that which it desires to know, any other medium is impossible. We are all born, at least we are all at *one* time,—and whether it is actually before or after we are born is impossible to be determined, and the determination of it is not required, as it is merely a matter of difference, and difference which, whether it could be decided to be always at one of the times, or sometimes at the one and sometimes at the other, would not in the least affect the truth of the main argument,—we are all, at one time, in utter ignorance, not only of those inferred truths at which we in time arrive by means of our minds, but of the whole external world, the parts of our own bodies, and even the fact of our existence. For, just as we must have something to know before we can have knowledge, and something to perceive before we can have perception, even so must we have something to feel before we can have feeling, let that feeling be the very simplest that we can name or even imagine.

Our own existence is naturally the first feeling that we can have, and, however faint it may then be, we cannot escape having it, the instant that any part of our body is effected, whatever the infection may be, and whether external or internal in its application. This first feeling would, if the succession extended no farther, speedily pass away, just as does the life of those infants which once open their eyes and then

expire, without carying with them the slightest knowledge of the existence of the world, or even of that light of which their young eyes caught one momentary glance in their early and easy departure from the scene.

This first feeling, if life survives it, is communicated to the mind as an element of knowledge, though it does not yet positively amount to knowledge even of the most simple kind. But when a second feeling is produced by another affection of any part of the body, it calls up the memory of the first, though to the body, that, or indeed any subsequent feeling, never again can return. There are now two feelings immediately present to the mind, as the first returns so instantaneously upon the other suggesting it that they are mentally felt as together; and thereupon there is an act of the mind,—the comparison of two elements and the discovery of a relation; and this relation is the very first portion of knowledge;—rendered knowledge only by the mental act, but still obtained from the sensations of the body, as, without this, the mind could not have obtained the elements.

We need not say that this first step in knowledge is a small and simple one; for it is so very simple that it does not admit of definition. Yet, being the first, it is the most important of the whole; and but for this little step, the artist never would have executed, the orator declaimed, or the philosopher reasoned. This is a step which cannot be taken but by mind; and therefore, small as it is, Man is the

only tenant of earth capable of taking it. The most perfectly organized, the most active, and, according to our common but most erroneous form of speech, the most sagacious of the animals, never can get even this length. These have the physical feelings, probably, much the same as they are in Man; but they want the mental power which fetches back the first, and compares it with the second, and therefore they have not the means of arriving at the conclusion, how simple soever that conclusion may be. In the emphatic language of Revelation, "their memory perishes," and with them it is once felt and gone for ever.

This first step of knowledge is important in another point of view, namely, the nature of the knowledge which is acquired. It is the first mental feeling we have of our existence, and as such it remains with us through life and after death,—as the feeling of mental identity, which is the foundation of our whole character, physical, intellectual, and moral, for eternity as well as through life. The body has no identity even of substance; for in the active exertion of life, it is probable that the same particle of matter never acts twice, and it is certain that the same organ, be that organ what it may, is never, in the sentient parts of it, composed of the same identical matter for even two consecutive days. Admitting, therefore, that either by some strange property of it which we do not comprehend,—which, in fact, we know that it cannot possess, but which we admit merely for the sake of the argument;—admitting this, and knowing as we do

by actual observation, that the matter of the body is constantly changing, and that it changes most rapidly in those parts which have the nicest sensibility, and are the most actively used—how could this knowledge be preserved, after the departure of the matter which alone was possessed of it?

The impossibility of this cannot fail in being apparent to any one of common discernment who will bestow but one moment's consideration upon it; and yet it was for a long time the belief of all those who philosophised on the nature of Man; and it is the belief of many of them still. Common language, as is usual in many such cases, is founded upon the error, and this tends to perpetuate it; for when we speak of identity, we speak of it as being "personal," that is, identity of the body, which is always understood when we speak of the person; and though this is an absurdity, the fact of its having been adopted, is a proof of our proposition; for hereby not only the means of knowledge, but the knowledge itself, is referred to the body.

This referring to the body of that which can belong to the mind only, involves fully as much absurdity as those references of bodily differences to the mind, of which some notice has been already taken. There is not a more exquisite mixture of sound philosophy and irresistibly cutting satire in the whole compass of language, than the defence in explanation of this doctrine which is given in the letter of the Society of Freethinkers to Martinus Scriblerus, which completely demolishes what it professes to uphold, and

does it with the greatest imaginable gravity. The passage has been often quoted, but it is so excellent that we cannot resist transcribing a portion:—"They make," say the Freethinkers, "a great noise about this individuality" (that is, personal identity, or the feeling which every man has that he is himself and not somebody else); "how a man is conscious to himself that he is the same individual that he was twenty years ago, notwithstanding the flux state of the particles of matter that compose his body. We think this is capable of a very plain answer, and may be illustrated by a familiar example:—Sir John Cutler had a pair of black worsted stockings, which his maid darned so often with silk, that they became a pair of silk stockings. Now supposing these stockings of Sir John's endowed with some degree of consciousness at every particular darning, they would have been sensible that they were the same pair of stockings both before and after the darning; and this sensation would have continued in them through all the succession of darnings; and yet, after the last of all, there was not perhaps one thread left of the first pair of stockings; but they were grown to be silk stockings, as was said before.

"And whereas it is affirmed that every animal is conscious of some self-moving, self-determining principle; it is answered that, as in a House of Commons all things are determined by a majority, so it is in every animal system. As that which determines the House is said to be the reason of the whole assembly, it is no otherwise with thinking beings, who

are determined by the greater force of the several particles, which, like so many unthinking members, compose one thinking system."

The extreme parsimony of Sir John Cutler, which suggested to Arbuthnot the first of these illustrations, is now nearly forgotten; but the other and more cutting part of the satire—that of the "many unthinking members" composing "one thinking system," remains as applicable as it was a hundred years ago; and thus the personal identity of a public assembly could be established, by the argument of the Freethinkers, just in the same way as the personal identity of one human being.

The story of the stockings is valuable on account of its mere humor; but it is far more valuable upon other accounts; for if we consider it carefully, we find that it involves the true doctrine of identity, at the same time that it ridicules the false. There is no changing the identity of Sir John's stockings, as *stockings*, though as *matter* they had been gradually changed from worsted to silk; for by the express wording of the case, Sir John had the stockings from first to last without once exchanging the old pair for new ones. At the same time it is equally clear, that there is no identity of the *material* of the stockings at the beginning and the end of the process; for they were wholly worsted in the first state, and wholly silk in the last. But it is evident that neither the identity of the stockings, nor even the fact of their being stockings at all, depends upon the kind of matter of which they are composed, any more than the

fact of the Lower House of Parliament's being a House of Commons would demand that it should be composed of the same identical members now that it was in the days of Dr. Arbuthnot. It is the identity of the form or appearance of matter, which constitutes the only identity of matter to our perception, unless we have an unbroken, continuous knowledge of it; and then our mental feeling of its identity becomes the same as our own, that is, the latter is the analogous case by which we establish the former.

The assimilation of new particles to supply the place of those which have become unfit for the purposes of life, is well illustrated by the change of members in a House of Commons, of which the whole system of election and procedure remains the same; for as long as the means and extent of the change of matter in the human body remain exactly the same, the form and appearance, and all the bodily faculties and passions, remain the same also, as may be observed in the case of healthy persons of regular habits, during a very considerable period of middle life. That the changes of personal appearance, and those of the body in other respects, take place in exactly the same ratio, would be too bold an assertion upon a subject which is necessarily involved in so much obscurity; but that there is an approximation which destroys the identity of the body, and of all the bodily feelings, in the changing periods of life, cannot for a moment be doubted.

Even in the ascertaining of this identity of appearance, however, as in all other cases, our senses

are our only means of knowledge; and when the perceptive powers of the body, and especially the connexion between body and mind, become weakened beyond a certain degree, we lose the perception of this identity of appearance, and do not know those who have once been our intimate friends, unless some circumstance is mentioned which brings them to our recollection; and then they come back to us as we knew them in the days of our vigor.

In consequence of the identity of the body being apparent only, and not substantial, and also liable to changes of appearance, the body, though the gratification of its desires, or desires entertained on its behalf, is often the cause of crime, yet the body itself is not morally accountable; and this is the reason why, in our courts of justice, derangement is held as an excuse for crime, and violent momentary passion as a mitigation of the measure of punishment that would be awarded to one who perpetrated the same deed from fore-thought purpose. Superficial observation would be apt to suppose that there is injustice in this; and it must be admitted that a man of ungovernable passions is a very unsafe member of society; but still his single act does not afford evidence that his moral habit is tainted with the crime, though the very passion itself is a bad habit, and may be said to be the cause of whatever is repeatedly done when the party is in a passion. The distinction here, however, becomes too fine for common juries or for ordinary laws—such as will apply equally to all parties in a numerous and varied community.

The mental identity, of which we have felt it necessary to give some account, for the purpose of showing that it is no part of our bodily or physical nature, is the foundation upon which the whole of our knowledge is built; and, in fact, the materials are in no case knowledge until they are thus built, any more than bricks are part of a building until they are laid in their places in its wall. To whatever extent this building may be carried, the senses are always the laborers that bring all the materials from without, though the mind which rears the structure may send them in quest of particular materials, which, according to the conclusions at which it has arrived, it believes will answer its purpose. But the sense, whatever it may be, takes no farther concern in that which it brings, after it has been delivered to the mind; but, making allowance for fatigue, and the rest necessary for its renewal, it is quite free from all embarrassment about the past, and is as ready for new labors as ever.

The remarks which have been made will help to explain to those who have not reflected much on the subject previously, the general character and use of the body in the business and conduct of life, whether public or private, professional or personal. From the general terms in which it has been stated, it is too vague, however, to admit of particular senses, or purposes to which senses are applied.

This general outline must also be considered as including action by ourselves, and the direction of action in others, which are in such cases executions

of plans which have been formed in the mind, as well as mere knowledge, which has no reference to future action.

That the work is succeeding according to the plan, and agreeably to our mental desire, or that it is completed and answers our expectation, is about the most gratifying intelligence which any or all of the senses of the body can bring to us. The opposites are by no means so pleasant; but still they are very useful, as they send us to reconsider our plan, in order to see in what we have been in error. The sense, in order to do its duty properly, has a nicer operation to perform in the case of failure than in that when all goes well. In the case of success we have no reason to ask "why," and therefore it needs not be done; but in the case of failure, the announcement of the simple fact, without the "why" along with it, is neither satisfactory nor immediately useful. Always, when we act like rational beings, that is, when we "know what we are about," we act upon a plan which we have formed or copied—we being original in the one case, and proceeding upon borrowed judgment in the other; and our desire of the success of our plans must be accompanied by, or rather it must originate in, as much knowledge of the means by which we believe our purpose can be accomplished, as to give our desire that degree of intenseness and certainty which makes it what we call a "will," upon which we act.

The formation of this will—which is only a name for a particular modification of desire—is rather a nice

matter; and as the immediate formation of it is an act of the mind, the consideration of it properly belongs to our Intellectual knowledge of Man, that is, of our knowledge of ourselves and others regarded as intellectual. But the materials upon which the mind works in order to arrive at this state of "will," must be originally derived from the senses; and, therefore, the power of exercising a very accurate and scrutinising observation is absolutely necessary before we can, in a rational manner, have a will about any matter which involves many parts or is difficult in the execution; and as the mental conception that we have of this plan must be all resolvable into elements, each of which would be intelligible to the senses if it were matter of external observation, these mental plans must, on the other hand, be so framed as that they are palpable to sense in all their parts; and, on the other hand, the senses must be so tutored and prepared as to be able to execute the several parts of a plan without any unnecessary labor of simplification on the part of the mind.

It must never be lost sight of, in the study or the instruction of ourselves—and in most cases the study, well conducted, is the instructer without any further trouble,—it must never be lost sight of, that the grand objects which we ought to have in view are, making the most of our time, and the best of our powers. The time is measured by the sun or the clock; and we cannot alter them in either way, for they will go the same number of rounds, whether we are active or idle: but if we measure time by our

own activity, whether bodily or mental, the length to which we can draw it out, as compared with the extreme of indolence, is often astonishing. Two men shall, for instance, be engaged in the very same kind of occupation, both shall have equal good will to it, and both shall appear to be equally diligent, and yet the one shall do as much in a week as the other can accomplish in a month. Indeed, the man who is doing the most in reality, very often appears to common observation to be doing nothing at all; for in the case of the will, as well as in that of the wing—and it is remarkable that the words should be so closely allied,—there is commonly the least flight where there is the most fluttering.

Now, the mind, considered in itself, can go as far and as fast as can be desired, for it feels no distinction in respect either of time or of distance. The earliest day that we can imagine is just as near us in a mental point of view as to-day; and the sun or a star when we think of it, is mentally at our finger's end before we have time to point that finger to meet it.

The senses which have local organs, and do not require an absolute contact of those substances which give the mind the *means* of information, are also pretty quick. Light comes to our assistance with very great swiftness; and though sound and scent are slower and more liable to variations, they march with considerable rapidity. But even the swiftest of these is nothing in comparison with the mind; and, when we come to cases in which contact is required, and the

object must be brought to the organ, or the organ carried to the object, the sluggishness of matter comes in, in either case, and the mind has to wait until the body has accomplished its task.

Some degree of this waiting is unavoidable in every thing to which we can put our hand; but still the shorter that this can be made it is the better every way. When the mind waits long, it is apt to wander; and then, though it requires no time to go on with that which occupies it, both time and trouble are always necessary in order to bring it back from its wanderings. Indeed, the time is often not only much longer and the trouble greater than we should be apt to suppose, but the return from a devious course into which the mind had been led while waiting, is very frequently impossible. We have no absolute control over the successions of our thoughts, and therefore a single wandering of the mind may make us lose the best opportunity in our lives, and one which may never be repeated to us. These delays are, as we have already said, produced by the slowness of the body in obeying the call of the mind; and thus we in general find that those who are slow in observing or in putting their hand to work, are generally feeble and irresolute in their minds, and that, from their very sluggishness in execution, they lose, or they never have, the desire or the capacity of planning.

We do not mean that either observing or acting should be hurried over in such a manner as that it shall not be done well; but there can be no greater mistake than to suppose that mere delay is in itself

an element of perfection. The fact is, that it is exactly the reverse in all applications of the body, and it does injustice to the mind at the same time. If well done, the more quickly that any thing is done the better, in the time saved, the habit acquired, and, generally speaking, in the superiority of the thing done. The very best authors, engineers, painters, musicians, and artists of all kinds—for they are all artists—are, generally speaking, those whose works are most numerous; and, if they should not have the high polish of the others, they are far more useful to the public in the way both of enjoyment and of example. The plays of Shakspeare have not the exquisite polish of the poems of Gray, and the novels of Scott have not the critical accuracy of the writings of Addison; but Gray was utterly lost in indolence, and Addison was so finical that, as a public man, he could neither make a speech nor compose a paper. Besides, with all the roughness which occasionally appears in Shakspeare and Scott, there is really more of the fire and life of intellect about them—something which, heedless of any nicety of appearance, takes by storm every heart capable of feeling. Besides, there is not a more valuable doctrine to preach to the public, especially the younger part of them, than that "A great deal may be done in a short time, and done well."

We once knew a painter, a curious miniature of man in his own person, who was a remarkable instance of this waste of time in laborious finishing, and of its effects upon the character. He had been in the service of the Pope, or the Doge of Venice, we forget

which; but when the French overran Italy, he returned to his native place, not unprovided for, though still disposed to paint portraits of such as could afford to sit and to pay him. It would have required some calculation to determine which of these was the most costly to a man in active employment; for, although the price was high, the value of the time required was not lower. The consequences were, that he painted few portraits, and those only of idlers who had nothing to do but sit for their pictures, and who had acquired such "genius" for doing nothing that they could bear the tardy imprisonment. Twelve months at least were said to be requisite for a single picture, and the sittings were certainly not fewer than a hundred. It is true that, when the picture was finished, it was to a very hair and a thread of the drapery; and wags allege, though we know not with what truth, that one victim became grey in the course of the work, and the hair had to be painted anew. The influence on the general habit of the artist was corresponding. He used to shave but once a week, and the business, which no barber could afford to perform, occupied the entire day from morning till night. Here again, it was alleged that, when he had shaved the one side of his face, he washed himself, went to dinner, and then returned to his labor on the other side; but we do not vouch for this assertion any more than we do for the former one, respecting which we have entered a caveat.

We have seen the artist, though he was seldom seen—not having been visible abroad for more than

twice in four years. We have also seen some of his works, and certainly there was a wonderful minuteness of finish about them. If there was a stray hair on the face, or an enlarged papilla, out of which the subject had somewhat indignantly extracted one in former times, there it was, so true to the original that it could not by possibility be mistaken. With a high magnifying power, the effect was almost nature—as exquisite as the flower painting of the late Ferdinand Bauer; but put it against the wall of a pretty large room, side by side with one of Raeburn's portraits, and what a contrast. Take a near view of Raeburn's, and it was harsh patches; take the magnifier, and it was daubs of mortar; but put them at the distance at which full-sized portraits should look best, and while the labored one was a cold canvass sticking on the wall, the other seemed to live, and come into the middle of the room to meet you. We do not mention the name or the place, though we suppose that there is not one now living to whom it could give personal offence, but the facts are substantially true, and the narrative is not without instruction.

To enumerate all the advantages which we derive from a ready, vigorous, animated, and rapid use of all our physical powers, whether of observation or of action, would be a long and a laborious task. It would also be, in a great measure, an unnecessary one, as we believe there are few who will not assent to the truth on the general principle. But mere assent to the truth is not what is wanted; for no truth is of much consequence unless something active, some-

thing that will help us in practice, can be founded upon it.

The practical inquiry here is, How shall we render our physical powers most useful? The general answer to this is, To procure a regular and healthy state of the body, and improve all the active organs of it, whether of perception or of motion, by such practice as shall give them the proper tone without wearing them out by over-fatigue. But this also is too general for being of any definite use, and though there are various professional trainings and trainers of the body, yet these are all for particular purposes, and these too not the most generally useful for the people of a working world; so that, in as far as these trainings do good in one way, they have a chance of doing nearly as much harm in another. They chiefly allude to fighting, or dancing, or bearing the body seemingly upon occasions of display; and as a nation of fighters, dancers, and exhibitors, would not be either a very agreeable or a very useful nation, something else is required, though to say what it specifically should be, even in any one case, is not a very easy matter,—as we never are sure in early life what use we may have for our powers, either of observation or of action, before we come to its close.

There is a preliminary part of the matter, however, which cannot fail in being useful to us, and that is, an outline of the knowledge of our physical structure, because this will, in part, lead us to the discovery of what it may want or admit of in the way of education; whether for its preservation under circumstances of

unexpected danger; its improvement in the acquiring of knowledge, or its efficiency in action. Of this, or some parts of this, an outline is intended to be given in the remaining chapters of this volume, but with as little formality or use of technical words as possible.

CHAPTER V.

PLACE AND PURPOSE OF MAN, AS INDICATED BY THE GENERAL STRUCTURE OF HIS BODY—STRUCTURE OF ANIMALS.

THIS is a subject which, if our limits would permit us to treat it at any considerable length, would be found far more agreeable as well as instructive to general readers than any disquisition upon the anatomy or mechanics of the body, how minute, accurate, and able soever it might be. It is, in other words, the question, "What was I sent into the world to do?" supposed to be put by every man for himself: and, though we cannot get a complete answer to it, on account of our imperfect knowledge of the data, and though no general answer could by possibility be so framed as to meet the case of every man, yet it is something to be put in the way, even by a few hints.

Indeed, it is probable that this "putting in the way," is not merely the best method of teaching most subjects, but that it is the only method of teaching which can reach the mind with that arousing and encouraging effect, which shall set it gladly and

cheerily on its mettle, and very soon bring it up to the pitch at which it will thank us for the hint, and then bound away, in the energy and exultation of young life and new power, distancing and dazzling us by the splendor of its progress, and the increasing radiance of its light. And, if there be one human position in which, more than in any other, a pencil of that joy which is eternal glances on the heart of man, it is when an instructer can, on the brink of the grave, turn his fading eye to the bright luminary which is enlightening the world, and say, "*I* gave him the hint."

And there are a thousand cases in which, if they who "bestow all their tediousness" upon us in the way both of oral and of written schooling, would content themselves with giving us the hint, and leaving all the rest to ourselves, we should not only be all much wiser than we are, but the paths of wisdom would be rendered much more pleasing to us, and we should not wander so often into the mazes of folly in quest of gratification as we have hitherto done. The difficulty lies in timing the hint well, and giving it with the proper effect; and he who writes with a view to instructing those who read has no power in the first of these, and labors under many difficulties in the second. But, even if ill-timed and ill-told, the brief hint is better than the tedious harangue; and it is especially better in cases where the subject is inviting, easy, and interesting. But no subject can have these three qualities in a higher degree than our own use and purpose in the world; and, therefore, it

is the very subject for hints, and that upon which short ones only are necessary, and imperfection of form cannot seriously diminish their effect. The fact is, that the very putting of this question to ourselves is useful, more especially when we are doing, or forming a resolution to do, that respecting the propriety of which we have any ignorance or donbt; because, whether we can answer the question satisfactorily or not, it brings forward our general feeling of our duty as a standard wherewith to compare that which we are doing or purposing. This supplies us with materials for a new act of the mind, in making the comparison and discovering the relations; and as one of the subjects of this comparison is the general sense or feeling of what we believe to be our duty, and the other a subject respecting the propriety of which we are uncertain, we actually bring the doubtful case to the very best criterion which we can obtain in the then state of our knowledge. But this is not all: for the general standard which we had previously formed is brought to the question itself; and it is compared and judged, by a shadowy standard no doubt, but still by the standard of what ought to be our duty; and out of this there arises the feeling of a new relation, and a fresh desire to know more of the shadowy standard; and when once a desire, especially a desire of knowledge, is fairly formed, that desire is in progress toward ripening to a wish and after that to a will; and when this comes, the adage holds true that "Where there is a will there is a way." This is a matter of great importance; and if they who essay to school us on

all occasions would reflect how much more fertile of knowledge our own desires are thant heir precepts, they would spare us the burden of the latter, and let us enjoy, to its full extent, the impulse of the former.

But waiving these subjects, which are, however, far from irrelevant to our present purpose, let us suppose the question of "what we are sent into the world to do?" put, and that we are endeavoring to answer it. Where shall we look for the answer to it? Certainly not to our own practice, for there our judgment must be biased. As little can we look with perfect satisfaction to the conduct of others, for very many of them are evidently doing what they were not, and could not be, sent into the world to do. We pass by the specific crimes of which the law takes cognizance, because the customs of society, without any exercise of our own judgment, forbid us to look to them. But we find a large portion of people, of pure name and reputation, fooling away their time in the most unmeaning occupations, or disputing and squabbling about public men and public measures, which have not the slightest bearing upon the real happiness of the disputants, or of any one else; and surely these are not doing exactly what they were sent into the world to do. Again, we find men harassing, oppressing, and imprisoning each other, not contrary to law, but by means of it; and surely neither they who make this use of laws for the *good* of society, nor the framers of such laws, can be said to perform exactly that which they were sent into the world to do.

Yet again, we find men exerting their whole ingenuity, and lavishing much of their wealth, in order to provide engines and other means by which men shall butcher each other by thousands, and we have thanksgivings offered up to-day for the slaughter of twenty A., and to-morrow for the slaughter of twenty B.; and, however conscientiously they may believe that all this is done for the furtherance of good order and justice, surely we cannot at once come to the conclusion that these parties are doing *quite* what they were sent into the world to do? We run over the whole of society, and a doubt rises as to the case of every class into which we can suppose it capable of being divided. We turn to our own case, and if we glance only a little way back upon our experience, we find that, in spite of the strength of our bias, there are doubts here also. Therefore it is not in the practices of men that we are to seek even the simplest rudiments of our answer.

And, if we reflect but for a moment on the nature of Man, or revert but for a moment to our own convictions of experience, we must feel convinced of the absolute futility of even attempting to get a satisfactory answer from either. As we have endeavored to explain in the former chapters, Man must proceed in all matters upon his own knowledge, and upon that only; and, as there is probably no case of any mixed or complicated nature in which this knowledge is not imperfect, and not a few in which it is little better than mere guesses, we can found nothing important upon it, as to what Man is really intended for.

But there is one source, from which, if we could but rightly understand it, we should obtain nothing but correct information, and that is the physical structure and organization of Man. The imperfection of human knowledge has nothing to do with this; for Man is the workmanship of One whose wisdom is complete and infinite, and whose power to execute the plans of his wisdom is equally efficient and equally perfect; and, therefore, we are here upon safe ground, whether our steps be few or many.

But how shall we begin? for we cannot make knowledge out of any single subject by means of itself; and therefore, we must have other subjects wherewith to institute comparisons, in order that we may discover relations as the means of our progress? Well, subjects are plentiful, and quite fitted for our purpose: we have other animals in great number and variety; we can observe the purposes which they answer, or, which amounts to nearly the same thing, the actions which they perform; we can compare their organizations with their actions, and as they are not, in any way, under the guidance of their own imperfect knowledge, but wholly obedient to the laws instituted for them by their unerring Maker, we obtain analogies which are perfect in themselves, and which will answer for standards in the case of that which we ask with regard to ourselves and our brethren. If we go, and go in the proper spirit, to the birds of the air, they will teach,—and to the beasts of the field, they will impart knowledge; so that there are really few questions with regard to which we are

so favorably circumstanced, if we only approach it with a little calm consideration.

And, what are the analogies which we are to bring from our observation of the other animals so as to be sure guides to the knowledge of the place and purpose of Man upon the earth? They are so few and so simple that a child in knowledge may understand them; and yet they are so full and perfect that the most enlarged and cultivated mind of all the sons of men cannot admire them enough, or comprehend more than a small fraction of their beauty and perfection. There is one single analogy, which comprehends the whole of the animals, of whatever size, form, appearance, or character they may be, and which comprehends them all equally; so that we do not need to take our induction from any larger number of them than is barely necessary to impress the truth of the analogy upon us, in such a way as that it shall be readily suggested to the memory whenever we have occasion to make use of it. All the animals have certain and definite places in nature, in respect of climate, food, locality, element, and every thing that we can name as affecting them; and they themselves are fashioned, organized, and endowed with instincts, which fit them for this their proper place and object in nature, and to this fitness the whole of their structure and their disposition are limited.

In consequence of this, they of themselves form one of the most satisfactory and delightful studies,—a study, in the prosecution of which, when one has once broken the crust,—and that is of such a nature

as to give way to a willing mind, without leaving the impression that there has been any crust at all—one never tires; and so extensive and varied, that it is novelty to the end of life, even to those who pursue it with the greatest ardor. Hence, if there is any one so dull that nothing in the common way of life can rouse him, so fickle that nothing can fix him, so fastidious that nothing can please him, or so any thing wrong that nothing common can make him any thing right,—to such a person, if there be any such—whatever may be his acquirements or his rank in life, we would say, study the localities, the occupations and the apparent natural uses of animals as deducible from them; and, when you have done so, examine their structures, and the way in which they work their structures, by the simple impulse of nature, and without the aid of precept or example of any kind. Then, when you have carefully examined the two, compare them together; and say, if you dare, if there is any one truth, in the whole scope of your experience, more palpable and more irresistible than that the place and office have been made for the animal, and the animal for the place and office? So perfect is the adaptation each way, and so perfectly reciprocal is it both ways, that you cannot separate the two so as to class them in any order of succession, and decide as to which existed first. You cannot say that the animal was made for the place and office, and as little can you say that the place and office were made for the animal; for whichsoever you take first, the claim of the other to priority is so equally good, that you feel

yourself like the ass, equidistant between the two equal bundles of hay, seeing both equally tempting, and equally within his reach, and so standing stock still and starving himself to death, in doubt between plenty and plenty.

This puzzle,—for there was a time when those who claimed the high places among reasoners occupied themselves most learnedly and gravely about such matters as this,—this puzzle, as it has come in the way, is worthy of a passing word, inasmuch as it is another instance of the perplexity which arises from the false analogies which people, in all ages, and of every variety of rank and education, are so prone to institute between the animals and Man, and then to reason upon them as if they were natural and well-established truths. Neither the gravity of the subject, nor the nature of the case, will admit of our saying that the contriver of this puzzle "made an ass of himself," for the making lay quite the other way, as it does in all these false analogies: he went almost to make a human being—himself if you will—of the quadruped. If the bundles of hay lay equally distant, right and left, neither ass nor schoolman could see them both at one and the same instant. The ass, if hungry, would go straight to the one which it saw first: or, if it did not go to that one, and then saw the other, it would go to that other; and because it has no mind and thus no means of remembering and comparing, it would go to the second in utter ignorance that it had ever seen the first. The man, on the other hand, would remember the first, compare it with the second,

and determine and act upon the conclusion deduced from this comparison. Supposing perfect equality in the appearance of the objects, the decision would be a matter of feeling, and depend on the impression made by each of the objects; and as the sensations are near to each other in time, in which case a first impression necessarily has some advantage, the chance is, that the first would be selected even after the second had been examined; but much would depend on the experience of the individual, and the habit arising out of that experience. These are not, however, the analogies to which we must have recourse if we are to make the animals useful to us in the study of Man; for they generally betray us into error, and never, in any one instance, lead us to the truth.

The perfect reciprocity which is so early seen between the place of an animal in nature, and the organization of that animal, is an instance of a very different kind of equality from that of any two objects of sense. In the case of such objects the act of the mind is immediately consequent upon the mental perceptions of the two; but in the place and office as the one subject of comparison, and the organization of the animal as the other, each is a generalisation of very many particulars, and thus it is a mental comparison, far removed, in train of thought, from the original elements supplied by the senses, and not suppliable by any other means.

These long generalizations are troublesome matters to deal with; and we must take especial care not to

throw the decision of them upon the comparison of any single similar parts, one taken from each. A case will illustrate this more clearly than reasoning. The point at issue must be the preference of some one compound subject to another compound subject, comparable with the first, and therefore of the same kind; and in order that we make our supposed case applicable to that of a real case of mental doubt, we must suppose that the umpire is as yet ignorant of both, just as a judge and jury are understood to be ignorant of both sides of a suit at law, until the barristers give "tongue," and the witnesses tale. The case in point is in reality the decision of the mind as to which of two former states pleases it the best; but as this is the ultimate condition to which every case must be brought before it can be decided, the particular instance on which it is taken up is a matter of no moment. Well, then supposing the dispute were whether Buckingham Palace or the National Gallery at Charing Cross is the more contemptible specimen of architecture; and that the party appealed to has not seen either, which is essential to a perfectly unbiased decision,—what should you think of the practice of the court, if Counsellor A. opened by throwing down a brick of plaintiff Palace, and Counsellor B. replied by throwing down a brick of defendant Gallery; and then the Judge delivered his charge: "Gentlemen of the Jury, you have been sworn to do justice between the plaintiff and defendant in this case; here is a brick of the plaintiff, and there a brick of the defendant; the point for your consideration is, whether the plaintiff or the defendant has

the more 'lean and hungry look,' and you will return your verdict according to the evidence."

This sounds not a little absurd, when applied to two mechanical combinations of solid matter, which are objects of the senses, both in the parts of which they are composed, and in the compounds produced by putting these parts together; and we can at once see that the absurdity arises from our not having the whole case before us. We desiderate the other materials, the relations in which they have been placed according to the plans of the architects, and the general relation of each structure to the situation upon which it has been erected, and the point from which it is most conspicuous; and, until we have all these fairly before us, it is impossible that we can come to any thing like a judgment upon the matter. The last is an important relation; and from want of attention to it, Goldsmiths' Hall, which is a pretty building enough in itself, has, as was remarked by an eminent architect, very much the appearance of an ἀφοδευτήριον appended to the General Post Office.

But if we feel this absurdity in cases where the compound is an object of sense as well as the parts, much more must we feel it when the compound is only a mental generalisation. This is the source of the majority of our errors in thought; and as we can act only according as we know, it is the source of very many of our blunders in action—and of not a few of what are called wilful crimes.

Thus, in the case under notice, and for the proper understanding of which some such illustrations as

these are absolutely necessary, the general conclusion is, that the animal was made for the place, because the place cannot come to the animal: but this is a partial decision, for it is the fact of the aptness, the adaptation of the place, which makes us find the animal there. Therefore, when we look at the whole case, we are compelled to believe not of the individuals, but of both as taken in their general characters, that they are subjects of one perfect and indivisible design,—products of one simultaneous creation; and this gives us a higher interest in the study of them.

The interest which this subject possesses in itself, and the fact of its being the only one from which we can obtain a standard whereby to judge of our own place and purpose upon the earth, harmonises so well with the ease and facility which every one has for this study, that we can hardly avoid instituting another comparison here, and feeling the conclusion that we were made for the contemplation of nature, and that nature was equally and simultaneously made to be contemplated by us. We may use the general term *nature*, instead of the restricted one *animal*, because the same interest, the same facility, and the same lesson, run through the whole, extending not to all the earth merely, but to whatever is known to us or can be discovered by us in the heavens.

And, as if more completely to insure our study and knowledge of that which has so many charms of invitation and so many facilities of approach, the lesson is by no means confined to the simple knowledge of our place in the system; for it is here that we have

to obtain both the materials of all our arts, and the elements of the knowledge which enables us to fit those materials to the purposes which we desire. Except our bodily feelings, and these are of little or no direct use to us, the creation, as it appears to the senses, is the school of our instruction as well as the arena of our action; and it is very doubtful whether all our accurate knowledge of our bodies—all that can deserve the name of knowledge, is not obtained by analogy from external nature. There is not one of the local senses which has knowledge of its own organ: the eye does not see itself, the ear does not hear itself, and all the rest are in the same predicament. The foot or the finger does not feel its own length; and the body, taken as a whole, knows nothing whatever of its height, its thickness, its weight, or any other quality that it has. A person who has had no practice in judging of measured lengths by the sight, cannot tell the measure of his finger within half an inch; and even one who has had practice this way could not be positive of being within a quarter of an inch of the truth. There is a simple but very decisive experiment about our supposed knowledge of so simple a matter as length without a standard of comparison. Take a small bit of smooth stick, of uniform thickness, and, say, nine inches or a foot long: hold one end of it between the thumb and finger of one hand, shut both eyes, and draw the thumb and finger of the other hand very quickly two or three times along the length; then, still keeping the eyes shut, draw the thumb and finger another time along the stick, as slowly as you

possibly can: grasp it when you think you have reached the middle; then let go with your other hand, open your eyes, and see how near the middle you have the stick. Try several times, at a different rate of slowness each time, and you will find that you never fix twice on the same place for the middle, and not on the middle itself in a great number of trials.

This fact, and many others that could be mentioned, is a clear proof that we are indebted to comparison with the external world for all that we know about even the magnitude of our own bodies; and that we, in truth, come into life with nothing but a capacity for learning, in the exercise of which capacity nature is our only school. Of other human beings we speak not; because the knowledge of them must be different from that of the other objects of our senses, in as far as the subjects are different, just as is the case in all the rest of the field of our observation.

From such considerations as these,—and any one who chooses to pay common attention to the subjects may, without science or learned means of parade of any kind, but just by that simple exercise of the senses which every one can perform, and cannot help performing;—from such considerations we can, and indeed must whether we will or not, draw the conclusion, that our primary object and purpose is that of being observers; and if we find that our organization more especially fits us for this, then we may consider the truth established by the very strongest species of proof of which such truths are capable. To do this in the best, and at the same time in the briefest manner,

we must return to the analogy of the animals, because it is in them that we see that adaptation of structure to purpose, in which there is the most resemblance to what we should wish to discover in ourselves. As we pass to that subject we may, however, remark, that when, in another volume, we come to consider Man in an intellectual point of view, we shall be able to see that there is nearly the same coincidence between some of the laws which apparently govern our mental procedure and those which govern the external world upon the large scale, as there is between our bodily organs of perception, and those objects from which these have to acquire the elements of knowledge.

In our endeavors to trace the analogy between place and office on the one hand, and organization on the other, as these present themselves to our contemplation in the animal kingdom, it is of little consequence what animal, what part of an animal, or what active state of an animal, we take as our means of illustration, so that we take it as it exist in free nature, and without any of those changes and restraints which are imposed upon it by human means.

One great advantage of the subject is, that any one may observe and understand it, without any expense of preparation or loss of time. The inhabitant of the country may do it in the time when he is occupied, whether simply in his own manual labor, in managing the strength of animals, in superintending the labors of others, in watching over their conduct or their health, or simply in beautifying, adorning, and

rendering more fruitful that portion of the soil of his country over which the chances of life have made him steward, and of his stewardship over which he may rest assured that he must one day give an account. Even in the most crowded part of the most extended city—the part most remote from any thing green and growing, there is still a remnant of nature, in which, small as it is, the prefection of natural adaptation may be observed; so that we cannot imagine one spot within the land, at which Man has not some means of applying the analogy, and ascertaining the purpose for which he is sent into the world. The sparrow and the house-fly accompany man into the most retired court or alley; and there is more of real instruction in their living action and the structure which fits them for that action, than there is in the most costly and curious museum of skins, skeletons, and mutilated fragments of strange creatures, of which the habits and the uses in nature are not known.

Any one of these very common creatures is quite enough for putting us in the way; and if we can make a beginning, we are sure to go on. The house-fly is the most general, the most easily observed, and the most curious. Its purpose in nature is to consume various substances which are given out by the human body, by articles of food, and by almost every animal and vegetable production when in a state of change, and given out in such small quantities that they are not perceptible by common observers, neither are they removable by the ordinary means of cleanliness, even in the best kept apartment. For the performance of

this office, the fly has a command of the house far greater than he who calls the house his property. He may have built it, and he can pull it down, but still he is not so completely at home in it as the fly is. So that, whether it be cottage or palace, the fly, if it had any power of speech, might say to the man, "You have labored and built, but it has been for my accommodation; for that which is to you merely a shelter affords me all that I require, in food, in clothing, and in habitation." And, though the fly has no voice of any kind, or any passage of air by the mouth, yet the lesson which it affords us is not less intelligible or instructive than if it were given in the most eloquent and appropriate language that man can use. Indeed it is more so; for it has all the freshness of originality, and goes immediately to the mind, while the other is only at second-hand, and the words may sound in the ear, or be seen by the eye in reading, without making the least impression, or leaving even the simple memory that they have been heard or seen.

The structure of the feet of the fly, by means of which it can walk upon any surface, whether rough or smooth, and whether presented upwards, downwards sideways, or with any degree of obliquity, is a very curious matter. It runs up the smooth glass of the window with more apparent ease than we can ascend the best constructed staircase; and it can alight from the wing, or take the wing again, in any direction. When flying, it has the back uppermost in the same way as a flying bird or a walking quadruped; but it

can instantaneously start from its position on the window with the back outwards, and settle, after its flight, upon the ceiling, and its back downwards. So easily, so quickly, are these turnings of the body effected in the fly, that we cannot observe the performance of them, though we are certain that they must take place; and such is the power of wing in this small and apparently insignificant creature, that it can mount up almost, if not altogether, in a perpendicular line, and that without our being able to observe the motions of its wings. The motions of the small gnats which come out when the air is still and warm, especially after a shower but sometimes over the snow, are still more remarkable. Not one of them, in all probability, sees the light of two days; and they are known to common observers only as sporters in the atmosphere; and yet they present almost the utmost perfection of organization for motion that we can name. The whole assembly are like a changing cloud: now spreading, now contracting, now rolling like a ball, now revolving in circles, and performing more evolutions than we have words to apply. Then, while the whole mass are thus continually moving, each individual is as continually changing its relative place among the rest; and if the position of the sun upon the pearly films of their little wings is favorable, their paths beautify the air with countless little rainbows, varying and shifting, and appearing and vanishing, in a manner the most extraordinary. There are few places at which these may not be seen; but though they present a very beautiful display, we

cannot examine them so closely as we can the house-fly, and hence they are not so instructive.

It has often been said that this fly is enabled to move along smooth surfaces, which are vertical or turned downwards, by means of suckers on the feet, which adhere by the pressure of the air; and in some of the books there are accounts of the way in which these suckers act, accompanied by figures of them. But this is at variance with the analogy, and also with the fact. There is no foot of any animal which adheres by means of a sucker, and is used alternately with other feet in walking; and it is doubtful whether, in the cases of animals which adhere by what are called suckers, they really use those organs as such, or whether they merely apply the fine papillæ to those surfaces to which they adhere. Be that as it may, the fly certainly adheres to the glass by means of the pads on the feet, and the little claws at their extremities; and the wings are always ready to come into action if the claws should not be able to retain their hold.

We have given these instances of general adaptation, because the animals are so small that their several parts cannot be well distinguished by common observation; and because their whole structure and economy are so very dissimilar to our own, that no inference drawn from the one will apply to the other, as a comparison of similarity. We shall now allude, briefly, to one or two cases, in which the organization and the use are better seen; and in these it will signify little, where we choose our locality or what we select as our subject.

Confining our observations to the vertebrated animals, we may consider their places in nature as being in the waters, on the earth, and in the air; though the birds are really inhabitants of the earth, or of that which is rooted in or supported by the earth, and the mammalia really live in the air, only they are more habitually supported by the earth than the birds are.

In noticing some of these as illustrations, it will not be necessary to advert to that part of their structure which fits one class of them for breathing in the air only, and another for breathing only in the water, because the organization by which they are enabled to do so is not open to common observation, and cannot be fully examined, in the living state, even by the most experienced of scientific students: but we may remark, that in this, as well as in those organs and systems of animals which cannot be seen by us, the adaptation is as perfect as in those which we can see. In the water, for instance, a fish which inhabits at the bottom, one which inhabits the middle depth, one which inhabits near the surface, and one which, from the state of the seasons where it is found, must sometimes have to take short journeys upon land—all have their breathing organs so varied that no one of them would feel completely at home if it were to be confined to the locality of another. One of the mud-fishes, for instance, which have the eyes in the upper part of the head, and their mouths so adapted as to be able to catch only what is above them, would be oppressed in its breathing, as well as starved for want of food, if compelled to remain near the surface; and a mackerel

would suffer in the same manner, if it were compelled to remain half buried in the mud.

There are also varied adaptations in the breathing organs of animals which breathe air. If they live wholly or partly in the water, as whales, seals, and some of the fishing birds, they have one form of organs; if they are always on the surface of the land, they have another; and if they are much on the wing, their large bones are hollow, and they can in part breathe without the use of the nostril or mouth. In all these varieties, also, each is admirably fitted for its own place and habit; and, from the simple fact of being so, it is not so well adapted for any other. All the parts of what may be called the vital system—that which carries on the life of the animal without having any obvious specific action upon the rest of nature—presents the same beauty of adaptation; so that the part of the animal which supports what we may call its working structures, is just as well adapted to its proper locality as the working structure itself; and one possessing very moderate knowledge as a naturalist would be able to tell, from the examination of those structures, or of any one of them, what were the general place and habit of the animal.

But it is in the working structures—the organs of motion and prehension—that the adaptations of animals are most easily seen, and most strikingly displayed. The grand *personal* purpose of all animals—that which forms the *business* of the individual among them, and answers, so far as the one can answer to the other, to that business, occupation, or profession,

for which we have to acquire knowledge and learn action—is the finding of their food; and this, therefore, is the part of their economy from which we must derive our standard, whereby to judge our own case.

The use of the animal in the system of nature, which is the parallel case to the use of Man in society, does not need to be taken into the consideration here; indeed, it is better left out, as it would only confuse the other part. The finding of the food, however, involves several considerations. The animal must be able to go where the food is, and when the supply at one place is exhausted it must within certain limits be able to seek for a fresh supply in another place. It must be able to seize or otherwise obtain possession of the food; to pursue it if it be of such a nature as to attempt to escape; to master it if it be such as to offer resistance; and to prepare it by dividing into parts, by the separating of extraneous substances, or by the performance of any other operation which may be necessary. It must also, within certain limits, be capable of preserving its existence against the casualties of place and time, and also against enemies—which last may be done by defence, by flight or by concealment.

Each of these varies much in different animals—so much indeed that the same description will hardly apply to the whole; but still the analysis obtained by these three divisions enables us to see the matter more clearly, as it presents the animal to us in three distinct lights. There is also some advantage in the

use of a general term for the organs, which are more peculiarly adapted and applied to each of these three classes of functions or labors, as that saves the confusion arising from the use of a number of particular names, and also the danger of narrowing the subject by the too frequent use of a particular name in a general sense.

Precision of language in this respect is a very important matter—far more so than one would be apt to suppose; and it is highly probable that many of the mistakes upon it which have been ripened by time and use into most inveterate prejudices, were, at first, nothing more than verbal blunders, or the careless use of words, which did no harm in the case of those who first applied them, as they of course knew the meaning independently of the use of the word. Names and terms ought certainly not to be unnecessarily multiplied; but, unless a great deal of nicety is used, both in respect of the meaning intended to be expressed, and also in the nature and use of the language, there is always danger of error in employing a word already in general use to express something new. The word "hand," which has been applied to the feet or paws of the apes, monkeys, and other climbing animals which climb chiefly by the grasp of that organ, and not by clasping with the legs or holding on by the claws, is an instance of this unhappy nomenclature, and is no doubt one of the foundations of the supposed similarity between these animals and man,—though a paw of this kind could not perform rightly any of the proper functions of the hand, and the hand would

feel as much difficulty in performing the proper functions of the paw.

The three great classes of active organs, arranged according to their functions, may be termed organs of motion, organs of prehension, and organs of defence. But as the purposes of nature are always accomplished at the least possible expense both of parts and of energy, it is only in particular cases that an organ of any one of the three classes is confined to a single function, though there is always one of the three for which it is better adapted than for any other, and its class is of course named after that. Thus, the teeth of a dog are his defences as well as his offensive weapons when he offers battle; but still their proper function is the seizing and preparing of his food: so also the heels and the teeth of a horse are occasionally used both for defence and for attack, but the first properly belong to his organs of motion, and the second to his organs of prehension. The chief organs which are used for attack or defence, and but little for any other purpose, are the horns of animals, including among the rest the nasal horns of the rhinoceri, the tusks of elephants, the beaks, and also the spines with which some fishes are armed, the spines of porcupines, hedgehogs, and some other animals, and the spurs upon the tarsi of birds. Some of these, more especially the produced beaks of the fishes, which are either produced teeth, or elongations of the bones of the head, are probably more or less used in procuring food; but the greater number of those which have been enumerated are weapons and nothing

else. The tusks of the hippopotamus, the enamel of which is probably the hardest animal substance known, and the core or bone, which is one of the most firm and compact, are formidable weapons to look at, but still the regular and proper use of them to that powerful and clumsy, but inoffensive, animal, is the breaking and bruising of its very coarse food.

The basis or foundation of all these systems in the animal, is the skeleton, or bones; and here it is worthy of remark, that the skeleton forms a very remarkable partition, or, at all events, indication of parting, in the body of the animal.

The centres, at least of what are called the vital, nutritive, and sentient systems—the heart, the lungs, the stomach, and the brain—are placed in part or wholly within the skeleton, and have not any base of insertion upon it as the fulcrum from which they originate their action, though it helps to keep them in their places. The only exception to this last is in the working of the lungs in respiration; and then it is very doubtful whether the lungs have any proper action farther than arises from the elasticity of the membrane composing the air cells and the irritability of their surfaces. The muscular part of the process of breathing is produced by the muscles of the thorax, and by the diaphragm which separates that cavity from the abdomen.

The working of the lungs themselves is so different from most of the other actions of the body in which motion is concerned, that a mere notice of it may furnish a useful hint to such as have not already

thought upon that very common and indispensable, but very curious operation. One particular of it is important, as pointing out a line of distinction between the portion of the body over which we have control, and that over which we have none—at least none directly; but it is not upon this particular that the question has been raised.

The question is, "How came we to use the lungs at first?" and it will be observed that this is not a futile question, such as if we were to ask why there are any human beings in the world; for it is not a question of original existence, or even of any particular form of existence, it is merely a question of a new action in a body already existent. Before birth, there is no respiration and no use for it, as the supply of matter has undergone that operation before it is transferred from the old life to the new. The lungs are therefore not needed, and the position of the body compresses them into a smaller compass than they afterwards occupy. In consequence of this, lungs which have never breathed are heavier than water, and sink; and lungs which have breathed, if only once, are lighter than water, and swim; and this is the most certain way of deciding whether an infant found dead has or has not been still-born.

But the lungs are not only compressed into less room before birth, for they are actually compressed like a squeezed sponge, and expand whenever the pressure is taken off. The moment they expand, the air rushes in by the nostrils and mouth; and the force with which it enters carries the expansion a

little beyond the natural state. This acts as a stimulus upon the muscles, which immediately contract, diminish the cavity of the chest, and, in conjunction with the elasticity of the lungs, expel the air, till the lungs are again reduced to less than their natural capacity; and this stimulates the antagonists of the former muscles, namely, those which expand the chest, and they assist the pressure of the atmosphere in again filling the lungs. The expansion of the lungs is always produced by their own elasticity, for no muscular apparatus could work so fine a structure; but the expansion of the chest gives room; and the contraction of the chest again occasions the expulsion. Thus the lungs are set a-going by atmospheric pressure and elasticity; and the action is kept up and regulated by these and muscular force jointly.

The only part of this process which we can control, is the muscular action of the thorax and diaphragm, and we have but a limited control over that: we can draw "a long breath," but we cannot keep the chest long expanded by "holding our breath;" and if a man were to form ever so determined a purpose of holding his breath till he strangled himself, nature would break through his determination, and that before he had suffered any injury. Those muscles which are employed in working the lungs being the only portion of our vital system over which we have any direct control, are also the only part that we can improve by education. They are also the only parts of it which have an origin upon the skeleton, or can

be numbered in any way among these portions of the body, in the use of which we are to take the other animals as our standard.

The skeleton, as being the foundation of the whole working structure, is, therefore, the most important part to study in order to understand the action; for all the actions of animals consist in the moving of the skeleton, or part of it, or something by means of muscles originating in it, in some direction or other. The organs of motion, by which the parts are moved in action, of whatever kind it may be, are always muscles; for although elasticity is employed in several parts, it works by reaction and not action, and the result of it is repose, or the state of greatest ease of the part. Hence, elastic substances are employed for repose, or for the continued action of parts, when circumstances require that the continuance should not wear out the animal by fatigue, as is done in all cases of muscular or positive action.

We have examples of these in the feet of birds, when they bend their legs on the perch, in the talons of birds of prey, in the claws of the cat tribe, in the feet of sloths, the claws by which bats suspend themselves when they sleep, and in many other cases in which one particular position of an organ is essential to that repose which is required for allowing the muscular or active part of the working structure to recover its tone. Man, and all those animals which lay themselves down upon the ground to take their rest, do not require this assistance from elasticity, and accordingly they do not possess it to the same

extent as animals which suspend themselves when they are at rest. But, even in Man, the position of perfect repose is not that of full extension any more than that of full contraction; and, to keep the fingers extended to their full length for a long time, is just as painful and exhausting as to keep them firmly clenched. The easy position is that which gives equal relaxation both to the stretching and the bending muscles.

The structure of the skeleton, not only in the number of its bones and their general arrangement, but in the shape of each particular bone, is adapted to, and explanatory of, not merely the kind and number of the muscles and other soft parts which are applied to the bone, but of the whole habits and character of the animal; and not merely of the animal alone, but of the character of the country for which it is especially adapted. Of course, this is a subject which requires not common observation of the living animal merely, but an intimate acquaintance with every part of its structure, and with the functions which that structure fits it for performing.

Knowledge of this kind can never, of course, be made available by the great body of mankind, the principal occupation of whose time and attention is about matters of very different, and, to them, much more valuable import. But, even to such, it is of importance to know what can be done, and what actually has been done in these matters, in order that they may understand what wonderful power human research, when directed in a proper manner, with

sufficient zeal and perseverance, and with an honest desire to know the truth without any bias in favor of a preconceived theory, has over the whole of that creation of which we are the only terrestrial students.

In consequence of this, the bones of animals become most important subjects in an historical point of view. In certain situations they remain for a long period of years, even in deposits of loose materials; and when once the matter in which they are contained has been hardened, or consolidated to the consistency of stone or of firm clay, which completely resists the action of the atmosphere or the escape of any of the parts of which they are composed, we absolutely cannot name a time beyond which a bone shall not last, and tell the tale of its possessor with not much less certainty on the general points, than if that possessor had been alive only a few years ago.

Many animals, of which not the species merely, but the whole race appear to be now extinct, are found thus recorded in the earth; and there are many more which are extinct in all climates in which the remains are found, and the living species of which, in different climates, are very much different from those which are found monumental in the general home and cemetery of all animated beings of whose existence we have any knowledge. And, according as they differ from the native animals now found in the same countries which contain the bones, they indicate physical changes in the state of those countries; and thus they form an indubitable history of the earth, commencing long before any thing recorded in the

comparatively brief annals of the human race. Of the specific degree of heat or cold, at the time when they were alive and active, they tell us nothing; for the temperature of a country, whatever it may be, tells little or nothing upon the bones of animals, whatever it may do on the soft parts, and especially upon the external covering. But in every case in which a very ancient native of a polar climate has had as much of its natural covering preserved, as that its adaptation to the temperature can be judged of, the indication, nay, the demonstration has uniformly been, that the country must have been cold at the time when it was a living inhabitant.

So perfect is the agreement of all the parts of the skeleton of an animal, with the character of the place which it inhabits and the functions that it performs, that these may, by an experienced comparative anatomist, be all inferred, and that with wonderful accuracy, from a single bone. There is a remarkable instance of this, in the remains of an animal found in North America. President Jefferson, though a man of observation and acuteness in most matters in which he had the whole case before him, was no scientific naturalist; and therefore he inferred that the bone, which had evidently borne a large claw or hoof, had belonged to an animal more carnivorous, more fierce, and more formidable from its size than all the lions, tigers, and other beasts of prey now living on the face of the earth. But when Cuvier came to apply science to this bone, and trace the relation of its use from its structure, he at once discovered that the animal to

which it belonged could not have had any murderous power in its claws; that, in fact, it could not have been a carnivorous animal at all; but that it had been a herbivorous tenant of a country in a wild and marshy state. We enter not farther into the details of this particular case; but it is important as showing the correctness of the information which observation and judgment can obtain, with regard to the perfection of that reciprocal adaptation which subsists between animals and their localities and habits; and, by necessary consequence, the advantages which we derive from using them as a standard, in order to form a correct judgment respecting the place and office of Man upon earth.

In what we ourselves can observe of the structures and adaptations of living animals, in each of the three classes of their active organs to which we have alluded, the case is still the same. In the case of simple motion in change of place, the wing for the air, and the foot for the earth, are easily distinguished. But then, the modifications of each of these to the variations of the use are not less wonderful. Thus, to take the wing: the wings of an eagle, an owl, a lapwing, a swallow, a common fowl, a duck, and a wide-ranging petrel, not to mention a hundred others which are equally well adapted to their various offices, are highly instructive. The eagle floats in the air, until its keen eye discovers, upon the surface of the earth, the prey which is to satisfy its want. Accordingly, its wings, though very powerful, are at the same time broad and hollow in their under sur-

faces, so that they can take a powerful hold on the air, and enable it to float with little labor. But as, when the prey is once discovered, the more speedily the bird can arrive at it the better, both wings and tail are organized for a rapid descent, and the eagle comes down like a meteor, so that one can almost see the tremulous motion of the air. The habit of the lapwing is to wheel, and double, and tumble about, shifting its course almost every instant; and, accordingly, there is a very peculiar curvature in the wings, which fits it for this species of motion. The owl comes upon its prey by stealth; and, therefore, the feathers of its wings are fined off, so that it glides noiselessly through the air, as though it were muffled. In the swallow, which has not to rush like the eagle, or to tumble in the air like the lapwing, but which has to follow the winged insects upon which it feeds, in all the mazes of their motion through the air, the wings, and also the lateral and more produced parts of the tail, are pointed, so that the bird can turn upon any of them as on a pivot, and thus continue the chase, notwithstanding the doublings of the sportive prey upon which it feeds. The swift hawks at a greater elevation than the swallow, where prey for it may be presumed to be less abundant, and to move less in sportive circles; and accordingly the swift is more powerfully winged for forward flight, but it has fewer points upon which to turn. The common fowl is a feeder upon the ground, and never takes the wing unless to perch, or get out of the way of ground enemies; and therefore its wings are more adapted

for rising and descending than for forward flight. The tail, which is an essential instrument in the ascent and the descent of all birds, is curiously constructed in these, so that it may be useful to them when required, and still not an incumbrance when they are upon the ground. For this purpose, the sides of it fold together when it is not required in flight, but expand when it is. The duck, also, has the wings with considerable concavity, and when it flies low its flight is rather fluttering; but when the species that migrate, get upon their high or migratory flight, their course is comparatively smooth, and their progress rapid. The wide-ranging petrels are remarkable for length and power of wing, and as they skim the surface of the water against the wind, they so balance their wings that the current comes below like a wedge, and buoys them up with much less effort than they would otherwise require to make. These must suffice, however, as specimens of wings, for many volumes would not exhaust even the popular notice of this curious subject.

In every case in which the wing is the principal organ of motion, all the rest of the structure, in as far as motion is concerned, is formed in subservience and assistance to the wing. In like manner, if the feet of a bird are the essential organs of motion, as they are in the ostriches and some others, then the whole of the other parts are subservient to these, and the wings are useful only in balancing the body; or they are, in some cases, but little available for this purpose, as in the emu and the apteryx, in the latter

of which the bones of the wings are barely produced beyond the skin of the body.

In the mammalia, none of which are fliers,—with the exception of the bats, and their flight is unseemly and fluttering compared to the flight of birds,—the organs of motion are feet; and no adaptation can be more perfect than that of the feet, both to the kind of motion which is habitual to the animal, and to the particular kind of surface upon which that motion is performed. If the feet are nothing but simple organs of motion, then they have their action in the plane of the length of the body only, the fore feet and the hind ones being equally true in this direction, and incapable of motion in any other, so that the foot cannot be brought to the mouth, or rendered in any way serviceable in conducting the food thither. Such animals never have any clavicle, or collar-bone, by means of which the shoulders, or articulations of the fore-legs, can be steadied in such a manner as to give them any rotation upon the shoulder joint, or motion in the cross direction to the axis of the body.

But no loss of the energy which it is capable of exerting is sustained by the fore-legs of the animal having motion in one direction only; for the whole of their capacity is concentrated upon that particular direction, and the single motion is far more vigorous in proportion to the exertion made, than any one of the motions is when the organ is capable of performing more than one. Hence, the animals that have no clavicles, and no cross motion of the fore-legs, are the most swift-footed of all animals, although

in this respect they differ not a little, with the peculiar situations for which they are adapted and the exertions which they have to make in order to procure their food. The buffalo and the ox, which naturally inhabit low-lying and rich pastures, are sluggish in their motions as compared with the wild goats and the antelopes, which have to range over comparatively barren surfaces.

The use of the clavicle is to give firmness to the shoulder-joint by a stay abutting on the anterior part of the sternum or breast-bone, to which it is united, not by a moveable joint, but by cartilage; or if there is great firmness required in the shoulder, and at the same time great freedom in the neck, as in birds of powerful wing, then the clavicles of the two sides are united into a complete arch; and the coracoid, which is a mere process of the blade-bone in the others, takes the form of a separate bone, uniting the shoulder-joint to the sternum. In those cases, the blade-bone itself is small compared with that in animals which have not this firmness of shoulder, as it has but little motion, and acts chiefly as one of the parts of the tripod, which gives to the shoulder-joint that great stability which enables it to sustain the powerful motion of the wing.

If swiftness and long continuance of motion, merely in forward progression, without any other specific action of the foot, as a grasping, clutching, or digging instrument, is required, then the blade-bone is taken into the moveable parts of the fore-leg, the *tarsus*, or principal length of the foot, into the hind one:

and, in all such feet, the toes only come in contact with the ground in walking, the extremities of them being armed with hoofs, not with claws or nails.

The horse is a good illustration of this; and the freedom of the blade-bone is a very essential "point," in judging of the kind of action for which a horse is best fitted. If that slopes far backward in the upper part, then the horse is adapted for getting fast over the ground, but comparatively weak in draught; and, on the other hand, if the shoulder is square, the horse is much more efficient at a dead pull, but much less capable of swift motion. The numerous varieties of horses which are to be met with, each of them the best adapted possible for some one purpose, and on that very account the worst adapted for any other, are among the most striking proofs that we have, both of the practical advantage that we may derive from studying the structure of animals, and the general truth, that each animal is especially adapted for some particular purpose in nature.

In all those animals which have the legs formed for progressive motion only, there are comparatively few muscles towards the extremities, the muscles being chiefly upon the upper joints, and the soft parts of the terminal ones being principally cartilages and ligaments. In various ways this is a very beautiful adaptation. The motion of the whole limb is what is chiefly wanted; and this is obtained by the concentration of the muscles on the shoulder. Thus the distal part, which has the most extensive and rapid motion to perform, is not loaded, and the parts of it

are such as not to be so liable to injury, either from use or exposure, as if they were composed of parts having more vital action. But when they are injured, they are more difficult to heal, as the power of healing in any part of the body, is always in proportion to the energy of living action in that part. This is, by the way, the reason why wounds, which would be very troublesome if not fatal to persons of disordered habit, are easily healed in children and those of vigorous health.

If the paw or extremity of the limb has additional action to perform, the freedom in forward motion is diminished; the shoulders are, to a greater or less extent, provided with clavicles; and the distal parts of the limb are more complicated in their structure, and more furnished with muscles: more care is also taken to protect them from changes of the weather, as well as from other injuries. The fleet animals always deliver themselves from their hoofs and alight upon the same; but all animals which use their feet as paws, have elastic pads from which they deliver themselves, and on which they alight. And, when the action of the foot in any other way than merely forward motion is great, the whole length of the tarsus is brought to the ground in walking, and the march is clumsy as compared with that of the hoofed animals.

Lions and tigers are animals of great muscular power, and they are muscular down to the very extremities of the paws; but, in their ordinary motions, hey are loose and twining; and the body seems a

subordinate part of the animal, intended chiefly for uniting the head and feet. This may seem to be a somewhat homely style in which to describe the mighty monarch of the African wilderness, and the gorgeous nawab of the Indian jungle; but it is nevertheless far nearer the truth than the terms in which those tyrants of wild nature are usually described.

A lion or a tiger is, in truth, nothing else than an organization by means of which clutching and rending claws, and tearing teeth, are brought to bear with the greatest certainty and effect, in lessening the numbers of various other species of living creatures; and beyond this, neither the one nor the other is of the slightest use in creation. When their hunger is appeased, they doze in perfect indolence till they are hungry again. Their dens are loathsome to the sight, and most offensive to the smell; and they never come abroad in peace to add to the beauty and interest of the landscape, as is done by animals of more elegant motions but less murderous dispositions.

And is it not a blot and blemish in the system of nature, that it should contain animals of such power, and power to be used only in the perpetration of cruelty? Far from it,—so far that it is one of the greatest beauties of the whole system, when we include Man in the catalogue; and it is not wanting in beauty, even when no particular reference is made to him. The countries which these formidable animals inhabit, are all, at the time of their plentiful inhabiting, unfit for human occupation, or at all events unoccupied by Man. Singh, the lion of India, is

unknown when that land of many vicissitudes is generally occupied by an active population ; but when war exterminates the people, and the jungle covers the obliterated ruins of the village, Singh comes again, no one can very well say whence, and claims it as his own. It is the same with the other powerful beasts of prey. When the late Mahratta war had desolated so much of India, it became literally infested with wild beasts ; and after tranquillity was restored, these beasts had to be subdued before the labors of the field could be securely carried on, or the domestic animals could be safe in the pastures.

The physical condition of Africa and India renders the presence of such animals absolutely necessary, if there is not sufficient human population to supply their place. It may not seem over-complimentary to Man, to tell him that he is only a substitute for a wild beast in the system of nature ; but it is nevertheless true, and literally true, if he does nothing in the world but simply maintain his animal existence. And, it is well for him that it is true ; for we shall see by and by, that Man, as a merely physical creature, has no place or portion in the world which he can call his own ; and therefore, if a power far exceeding all animal strength did not enable him to take the prey from the spoiler and the portion from the mighty, among the other inhabitants of the earth, there would really be no place for him, and no possibility of subsistence.

In all countries, but especially in the countries to which he have alluded, all those animals which are

most useful to Man, for food, for clothing, or for any other purpose, have a tendency to multiply far beyond the food that there is for them; and the supplies of food during the rainy and the dry seasons, which alternate so regularly with each other, are so different, that one half, or at least a great part of the animals which are actually required to keep down the individual growth of vegetation during the season of plenty, so that it may ripen seeds, would perish for want during the dry and parching time. Thus, taking it upon the general principle, these ravenous beasts kill and eat only that which, were it not for them, would die of famine or disease, and pollute the earth and contaminate the air with carrion. Even as matters are, there have to be scavengers to eat up the remains of casualty, as well as killing preyers to thin the numbers of the living; and not only insects and other small animals by myriads, jackals in packs, and hyænas in no stinted numbers, but birds of powerful wing, such as vultures and the large storks, are provided for clearing the land of the corruption of the time. These come from afar to their prey, by means which we cannot explain, any more than we can explain the means by which those migratory birds which are seasonally with us and seasonally gone, come, without memory or landmark, to the very same spot, after an absence of months, at the distance of thousands of miles. All these predatory animals, whether they prey upon the living or upon the dead, are just as essential in the system of wild nature, as those animals upon which they prey.

The perfection of the whole, indeed—that without which it could not be a self-supporting system, consists in the fact that each is supported upon the surplus of another—that surplus which, were it allowed to remain, would speedily become fatal to the very species of which it forms part. Man himself forms no exception to this: for were it not for the kindly interference of death, the world would soon be so encumbered by old persons, and hampered in by old prejudices, that both the means and the spirit of improvement would speedily come to an end. Thus, it is easy to demonstrate upon natural principles that it is good for the world we should die:—it remains for ourselves to prove the other assertion, it is good for the world we have been born.

The necessity for these beasts of prey in wild nature, the offices which they perform, and the fact that when Man once fairly takes possession, they vanish of themselves, faster than he can hunt them down, afford us among the most clear and striking proofs that, though there is no place or portion for Man as a mere animal, he may win any place and any portion, by means of that intellectual power, with which none of the other animals have any thing that can come in competition. This may seem an interpolation, and a breaking of the chain of consideration as to the organs of motion in animals; but when there is an inference to be drawn from any position, the more immediately that it can be made to follow the account of that position the better.

The paws of these predatory animals are, as we

have said, better made out in their bones, more abundantly supplied with muscles, and better defended against changes of the weather and other contingencies, than those feet of animals which are used simply for walking. They have, in consequence, certain motions of their own parts, independently of that general motion at the shoulder, which is the chief motion in a merely walking limb. Thus, the lions have imperfect clavicles, by means of which they are enabled to hug with the fore-legs, and use the paws, in a rude manner, but a very rude manner, as scraping and digging instruments, and also in laying hold, though only in a very clumsy way. For adapting the bear more completely to his peculiar mode of life, which, in all the varieties, is rather a rough one, and in some of them especially so, he applies the whole tarsus, or flat of the foot to the ground, which gives him a broad, and, by consequence, a firm base to stand upon, so that he can rear up upon his hind legs, and have the use of his body and fore-paws when in that position. Dogs, and some other animals which are *digitigrade*, or walk upon the toes and balls of the toes only, can partially rear up in this way; but then, it takes a much greater effort from them than from the bear; and, consequently, they have very little power either of the body or the fore-legs. To compensate to the bear in walking for the application as foot of that part of the limb which is used as leg in more appropriate walkers, the knee-joint is completely free, instead of being hidden in the muscles of the haunch, as it is in the others. The forward flexure or bend of this joint,

which is the other way from the backward bend of the tarsal or ankle-joint,—the middle one in the hind leg of an animal organized specially for walking, gives an appearance of shambling and instability to the bear when he walks: the great extent of paw which he applies to the ground further increases this; and thus, we do not feel that a bear is quite in his element when he runs, neither do we give him credit for so much swiftness and power of march as he really possesses. This is also one of the reasons why the bear is accounted so clumsy and ungainly an animal, although there are few that are better adapted to their purposes,—indeed, there are not any, for the adaptations of all animals are equally perfect when we come to understand that for which they are adapted.

The paw, that is, the fore-foot of the beast of prey, of which the lion may be taken as the model, is a far more complicated instrument than the paw of the bear; and, therefore, considered merely as it is used in walking, it has to carry a much greater load of what is not necessary in that operation than the paw of the bear. The clutching paw requires to turn on the wrist, so that it may grasp in different directions, and there are separate organs for moving the claws. All this requires a combination of muscles, bearing some resemblance in their general shape in mass to those of the fore-arm in Man, but, of course, different in their purpose and arrangement, and more powerful in their action, though not capable of the same continuous exertion. In this singular instrument of destruction, the action of walking is an inferior matter,

subservient to that of clutching and rending the prey. The bones of the paw are much harder and heavier than the bones of animals in general, and the muscles, tendons, and ligaments are all of more compact texture. In consequence of this, the animal can strike a terrible blow with the paw, without moving the body or using the claws,—this alone being able to crush a moderately large animal, and break the bones of one of greater size. Then, the simple clutch of the one paw, with the claws protruded, is sufficient to take such hold as not only to lacerate the flesh of an animal in the most serious manner, but to pull the bones out of joint, and, as the wounds which these claws inflict are lacerated wounds, and not clean ones, like those made by a sharp-cutting instrument, they are difficult to be healed, and the scratch of an animal of this tribe is often more serious than a sabre-wound. Even the scratching of the hand by an angry cat is far more likely to fester, and more difficult to heal, than a knife-cut of many times the depth.

But, powerful as is the action of the organs of destruction in these predatory animals, and much as, in proportion to their strength, it disqualifies them for the common operation of walking, it is but momentary in its exercise. The simple stroke or clutch of the paw may no doubt be repeated again and again, though there must be some excitement before the animal can make even this much exertion. But when the whole body comes into action, and the whole energy is exerted, strong excitement is required for the

preparation, and exhaustion follows the effort, whether it be successful or not. Such animals never course their prey so as to run it down. They lie in wait, or they steal within the proper distance of it, in a crawling and crouching manner, as if they were afraid of being seen; and such of them as seek for their prey in places of thick and tangled vegetation, have their fur so nicely fined off, that they can glide through the thickets without rustling a single leaf, and thus approach within slaughter-distance of the prey without occasioning any alarm even to the most ready ear. Even when they arrive at the distance which instinct informs them will suit their purpose, they do not make their attack at once, but crouch, lash themselves with the tail, and apparently use other means to produce a degree of excitement and ardor which is no apparent part of their nature, unless when they are pinched with hunger, or aroused in defence of themselves or their young.

The next step beyond this, in the adaptation of feet to other purposes than that of mere walking, or change of place in absolute distance, is that which is found in what are termed the "handed animals." These include the whole of the apes, baboons, and monkeys, both of the eastern continent and the western, as well as some other animals which have feet of the grasping structure, but differ from the characteristic ones in their food, and in various characters connected more or less with their feeding.

The whole of these are forest animals, and many of them exclusively inhabit trees, in which they are quite

as much at home as swimming animals are in the sea, winged animals in the air, or the common-footed animals upon the surface of the ground. When they walk upon the surface of the earth, some of them occasionly walk upon the hind-legs only, some go upon all fours, and some have the fore legs so long that they reach the ground when the body is in nearly an upright position; but whatever may be their more habitual mode of walking, they are one and all bad walkers, and the hind feet are generally, if not invariably, the worst adapted for this purpose. The loins are feeble; the articulations of the thigh bones are loose; the knees and ankles have lateral motion; and the tendency of the latter is to throw the sole of the foot inwards, so that they appear to walk best—if there be a best in such walking—upon the outer edge of it. This position of the foot is most conspicuous in the ouran-outang, and the other long-armed apes of the close forests of south-eastern Asia; but even the chimpanzee, which is by some regarded as the nearest approximation to the human form, excites painful feelings when it stands erect. This does not arise from muscular weakness in the animal, for they are much more muscular than human beings, and in cases in which their strength can be properly applied, they are much stronger. But, whatever may be their differences in other respects, they are all climbing animals; their extremities are simply grasping instruments, and the hind ones are generally the best fitted for this purpose, while in not a few the tail is lengthened, so that, though it can of course be of

no use as a prop in supporting the body, it serves as a new instrument by means of which the whole body may be suspended, and all the four extremities left free to catch hold of whatever they can reach. Some of those which have this organ the most efficient, as, for instance, the slender species from tropical America, which are called spider monkeys, have only a mere rudiment of a tubercle in place of a thumb on the fore-feet. Yet these, which, according to our estimates, formed as they are upon the models of walking animals are ungainly and helpless, are really among the most nimble and efficient of the whole, when they are in their proper place among the trees.

We shall not enter more into the details of the animal structure, though we heartily recommend this subject to the observation and study of the reader. There is one lesson to be learned from them all, and yet, in the many repetitions which may be obtained from a moderate extent of observation, each has its peculiar characters so clear and definite, that each has all the charms of novelty. We find in this kind of observation no inappropriate parallel to our own lives, if we spend them as the lives of rational beings ought to be spent. The scenes and the occurrences of life are new to us every day; but the enjoyment of life flows on in one unbroken current. Just so in the case of the animals. The varieties of structure are endless, but the beauty and perfection of the adaptation are one; and so admirably is each fitted to its purpose, that if we have proceeded only a little way in our observation, we soon learn to know either of

them if we know the other. No matter what the situation is, in respect of climate, surface, or any thing else, and no matter what may be the kind of food which that situation affords for an animal, or the means which must be resorted to for procuring that food; for, if there is food there, then there is sure to be an animal so organized to be able to procure that food, with the greatest certainty and the least expenditure of exertion: the work which this animal is appointed to perform is done in the very best, and, at the same time, the most convenient manner; so that, if we wish to study a model of perfection in plan and purpose, we have it at once in any animal in a state of nature.

The harmony of the organs is complete; and yet we cannot say that any one of them has been constructed with a view of adapting it to any other one. There is not the slightest trace of that "making out a plan by experiment," which is indispensable in the case of even the most wise and experienced of the human race—the more certain of being resorted to, the more experience that the designer has had. He makes trial of the nature of his materials, the forms of the several parts of his work, and the way in which these are applied and adapted to each other. In all of these, he has to try again and again; in many instances he has to sacrifice beauty to usefulness, or usefulness to beauty; and if the object of his design be an engine or machine which has to be worked, it is found impossible to give it equal strength throughout, or to contrive the parts so as that some of them shall

not wear out in the using much sooner than others. Then, though he should fancy that he has got it ever so perfect, faults will appear afterwards, and improvements will require to be made.

But the whole structure of the animal, and the office which the animal performs in nature, is one simultaneous design; and when we say that there is an adaptation of part to part, of organ to function, or of animal to office, we cannot say of one member of the comparison that it was made for the other, in any stronger manner, if we make the one the standard than if we make the other. The adaptation to the use is perfectly equal; and, taking each animal in its locality, or the whole of living nature, and the world, which is the theatre of living action, we cannot say that the animals have been made for the world, any more than we can say that the world has been made for the animals. The system considered as a whole is perfect; but it is not more perfect than even the simplest part of which it is composed.

With Man the case is different; not that the organization in Man is inferior to what it is in the other animals. If any distinction were to be made, the general organization of the human body would deserve the preference. But when we have once informed ourselves well respecting the structure of Man, if we then go to wild nature, seeking the appropriate place and office of Man according to his organization, in the same way as we so readily discern the place and office of every other animal, the place and the office of Man are not to be found. Human beings have never been

discovered absolutely in a state of nature; but the less removed they are from it, they are always the more wretched. They improve as society is cultivated and, in fact, the cultivation of society and the improvement of human beings, are only different names for one meaning. With other animals the case is the reverse: they may be improved for human use by domestication, but as animals they are always deteriorated.

CHAPTER VI.

SENSATION AND THE SENSES.

As there is no place or office in wild nature, for which Man is fitted by his organization as the other animals are fitted by theirs, it follows that the merely animal instincts of Man must be wholly incapable of enabling him to support himself, even in the supplying of his most simple wants. In illustration of this, it is not easy to put a case which shall be even intelligible, as the only practical instance which we can have is that of an infant, and in it the body is feeble and imperfect; and there is some difficulty in forming so complete an imaginary analysis as shall exclude the use of mind, and a certain degree of knowledge gained by experience; for we cannot carry back our memory to any thing like the beginning of thought, because there must be a train of thought, and a relation to another train, or to present sensation, before any former state of the mind can recur. If we suppose, however, that the first man was created in the full growth and vigor of his body, but in even greater ignorance than a child is at the moment of its birth, we shall be able to form

some notion of the utter helplessness of a man cast upon the world entirely without knowledge or experience of any kind; and that *he* should, at the instant of his creation, have had any knowledge, either of the objects of the external world, or of the parts of his own body—or even that he had any body, or any existence, is impossible.

Therefore, if we can only carry the analysis to him, at this most interesting moment of his existence, when he was in the full capacity for knowing, by the use of a perfect body,—when all nature was around him to be known, and yet not one sensation, not the slightest indefinable feeling of a pleasurable kind, had been experienced, we shall be able to understand how much and how rapidly he must have learned. If constituted like other men,—and if not so constituted he could not have been man, but must have been a being of a different order, of whose nature we can form no idea, and from whom, therefore, we cannot argue,—if he had been thus constituted, he must have felt hungry, or at least he must have felt a painful sensation, though an indefinite one, within no long period after his formation. But, upon the hypothesis of his total ignorance, —the only hypothesis which is of even the slightest value in the case,—he could not have known that he was hungry for food, far less what would satisfy his hunger, or what would poison him. The description which Milton puts into the mouth of his personification of Adam is poetically beautiful; but still it does not meet the philosophy of the case, inasmuch as it is, in its own nature and expression, an imagined descrip-

tion by a man of great learning, and not an attempt to embody the feelings of one yet wholly ignorant. We shall, however, make a quotation from it :—

——— "As new waked from soundest sleep
Soft on the flow'ry herb I found me laid
In balmy sweat, which with his beams the sun
Soon dried, and on the reeking moisture fed,
Straight toward heaven my wondering eyes I turn'd,
And gazed awhile the ample sky, till raised
By quick instinctive motion up I sprung,
As thitherward endeavoring, and upright
Stood on my feet; about me round I saw
Hill, dale, and shady meads, and sunny plains,
And liquid lapse of murmuring streams; by these,
Creatures that lived and moved, and walk'd, or flew,
Birds on the branches warbling; all things smiled;
With fragrance and with joy my heart o'erflow'd.
Myself I then perused, and limb by limb
Survey'd, and sometimes went, and sometimes ran
With supple joints, as lively vigor led:
But who I was, or where, or from what cause,
Knew not: to speak I tried, and forthwith spake;
My tongue obey'd, and readily could name
Whate'er I saw. 'Thou Sun,' said I, 'fair light,
And thou enlighten'd Earth, so fresh and gay,
Ye hills and dales, ye rivers, woods, and plains,
And ye that live and move, fair creatures, tell,
Tell, if ye saw, how came I thus, how here?'"

Paradise Lost, book viii. 253—277.

If such was the opinion of Milton respecting the degree of knowledge which the first man had at the very moment of his creation, what are we to imagine must be the opinions of the great majority of the human race, if they have any opinion at all upon the subject? If it be said that the first man was miracu-

lously endowed with knowledge, then there is an end of the argument in as far as the human knowledge is concerned, as we only stifle the demand made by one difficulty, by means of the louder voice of another; and, while doing this, we bring a charge of inconsistency against the Creator of Man. It is true that this charge is concealed; but poison is not the less fatal for being concealed from him to whom it is administered. Why should Man have required a miracle more than any of the other members of creation, unless upon the supposition that they were all fitted for their several places, and he was not? And this is only saying, that though the Creator could endow inorganic substances with their properties, plants with their habits, and animals with their instincts, yet that he was incapable of framing Man—a being who should derive the elements of knowledge through the senses, in the same way as the animals, but should act upon it by means of a far higher and more general power than any instinct—the power of mind. This is an error of precisely the same kind as the belief of innate ideas, which rendered the science of mind so long an absurdity; for the doctrine of the schools maintained, in fact, that Man had some knowledge of the world before he is born; and this alleges that the first man had a very considerable degree, not of simple knowledge, but of learning, before his creation. Even if we were to admit the fact of this miraculous knowledge in the case of the first man, it could not have become the groundwork of common human knowledge, because they are not, in any sense of the word,

quantities of the same kind. Therefore, in the real investigation of the question—the treating of it in such a way as that it shall be useful in the knowledge of ourselves, or of any thing else, we are left in precisely the same state with the miracle in the case of the first man as we are without it.

Hence we must content ourselves with the common philosophy of the case, and take it for granted that we get the very first article of our knowledge exactly in the same way as we get all the rest,—that is, by a certain organic change in the sentient organ or part of the body; and the immediate communication of this to the mind, by a process of which we really know nothing.

We must be complete and constant in the admission of our ignorance upon this point, otherwise we shall be certain of falling into one or another of those hypotheses which have made this portion of philosophy so repugnant to the feelings of all persons of common sense. It is usual, even with those who are not partisans of any particular hypothesis upon the subject, to speak of a *sensorium*, to which the organic changes made upon the sentient parts of the body are transmitted, before they can be known to the mind; and that there is a communication from this sensorium to those parts of the body which are to act, before there is any action.

Now, in the first place, this is purely gratuitous; that is, nobody can by possibility observe or know any thing about it. In the second place, it makes the mind a material substance, by assigning to it a parti-

cular state or locality within the body, or making space necessary to its existence, while space is really essential to the existence of matter only. The only notion that we can have of extent as in any way applicable to the mind, is the extent of the subject of its knowledge at the particular time, or rather in the particular instance, to which we refer; and the very same mind may be as completely occupied in the consideration of a single particle of the fluid which is in the smallest vessel of the most minute creature which the microscope can reveal to us, as with the earth, the solar system, or the whole universe. These states are all that we know of the mind: that it can be in them without the presence of their subjects as affecting the senses, or without any other natural cause, is a proof that it has an existence independent of matter; and the instantaneous transitions, and expansions, and contractions, which it can make, are such as we cannot possibly suppose matter capable of making. In the third place, all the facts, so far as facts can be obtained upon so very nice and difficult a subject, are against the hypothesis of the transmission of sensations in one direction or in another. No doubt the whole body is excited by strong sensations, as well as by strong emotions of the mind; but by what means these general excitements are produced, we have not any obvious means of knowing, and conjecture cannot be admitted in illustration of such subjects.

This last point is so essential to a right understanding of the general physical process of sensation; that again is so necessary to any thing like an accurate

knowledge of the mode of action in the different senses as the inlets of knowledge; and this is so essential to our being able to turn round the mental process upon the organ, and convert that which was at first the scholar into the teacher of its master; that every one should know something at least concerning them. For this reason, and also because the subject is curious, and rather contrary to our common language and belief, a few short observations upon it may be both interesting and useful.

In our common notions upon this subject we are very apt to suppose and to say, that the deeper any part of the body is seated, and the more essential it is as part of the vital system, the more intensely is it susceptible of feeling,—the word "feeling" being used as a general name for all organic states and their changes, which can in any way be communicated to the mind so as to be known. Now, this common notion is not only incorrect, but it appears to be totally without foundation; and that, in their healthy states, the most essential vital parts of the human body have no feeling at all.

Even in the stomach, into which matters not yet assimilated are received, it is doubtful whether there is any feeling in a perfectly regular and healthy state. We do feel hunger, and probably it is among the earliest of all our feelings; and we feel a sense of heaviness after a full meal, especially if there has been much sensation of hunger previously. But the feeling is painful in both states; and the pain of the repletion after hunger appears to arise from the change of

state being carried to too great an extent. Both, therefore, come under the denomination of diseased actions, though, if the system is otherwise healthy, they are but of a transient nature.

We feel the operation of breathing, but then this is a muscular feeling, the capacity of the chest being altered in the performance of the operation; and the lungs themselves do not appear to have any feeling when in a healthy state; and even when pulmonary consumption has proceeded so far that vesicles are formed in the bronchial substance, it is extremely doubtful whether pain is felt in that substance.

The heart, which is the centre of the system of circulation, and sends the blood to the lungs to undergo the action of the air, to the whole body for the support of life and the renewal of decay, and from the one of those systems to the other, is a muscular structure; and it is also probable that, though that coat of the arteries which consists of rings, or circular fibres, and the contraction of which propels the blood into the smaller ramifications and the capillary junctions with the veins, is not of the color of ordinary muscle, yet that there is some power of action in it of an analogous kind. But neither the heart nor the arteries appear to have the least feeling whatever when they are in the healthy state, and probably not even when they are diseased. The pulsation of the heart may be felt through the side; and those arteries which lie near the surface may be felt to beat. After violent exertion or excitement, too, the pulsation of the heart may be felt, and, in imagination at least, if not in reality,

heard, without the application of the hand to any part of the body. But the circulation of the blood is never felt, and the heart itself gives us no evidence whatever of its existence. It does not appear indeed that the heart, or any part of the system of circulation, would actually feel pain, even on the infliction of the severest mechanical injury; that the casualty which arises from injuries inflicted there, tells merely in the destruction or impairing of the function of the part; so that a wound which did not impair the function might be inflicted there and healed, without the party's having any knowledge about the matter.

We believe the first well-authenticated case that has been recorded of the insensibility of the heart to feeling of any kind, is that which was examined by the great Harvey, the discoverer of the circulation. A young nobleman had a portion of the parietes of the side destroyed by an abscess, consequent upon a fall. The wound healed, but without the restoration of the parts which had been destroyed by the abscess; and the heart and lungs could both be touched through the opening, without any feeling that they were touched. When he returned from his travels, the case became known to Charles I., who expressed a desire that Harvey might be allowed to see and examine him; and this was readily granted. "When I had paid my respects to this young nobleman," says Harvey, "and conveyed to him the King's request, he made no concealment, but exposed the left side of his breast, when I saw a cavity into which I could introduce my fingers and thumb; astonished with the no-

velty, again and again I explored the wound, and first mavelling at the extraordinary nature of the cure, I set about the examination of the heart. Taking it in one hand, and placing the finger of the other on the pulse of the wrist, I satisfied myself that it was indeed the heart which I grasped. I then brought him to the King, that he might behold and touch so extraordinary a thing, and that he might perceive, as I did, that unless when we touched the outward skin, or when he saw our fingers in the cavity, this young nobleman knew not that we touched the heart!"

A number of observations have been made, all tending to confirm the truth that the heart possesses no sort of feeling by which it can detect the presence of any external object; and there seems no reason to doubt for a moment that the same insensibility to the touch of external objects is common to all those inward organs which are most essential in the functions of life and health. Not one of them has any power of feeling by means of which it can inform the mind of its size or shape, or even of the simple fact of its existence. This is an admirable provision in the constitution of the body, both as regards the happiness of our existence, and the concentration of our mental attention upon those feelings which can bring us the elements of knowledge really useful to us in the conduct and business of life. But before we proceed to the particular illustration of this, it may be necessary to advert to a few more of the facts and arguments on the parts of the case.

Though the heart is thus quite insensible to the

touch, we must not suppose that it is wholly insensible; for, on the contrary, it is, in its own way, and for its own proper function, one of the most sentient organs in the whole of our curious and complicated system. The blood, between which and the heart that reciprocity of stimulation is carried on, which is so indispensable to the whole action of the living body, is every way as insensible to the touch as the heart is; and yet the action performed by the two jointly is one of the most delicate,—one of the most sensitive to changes of all kinds, even very minute ones, which it is possible to imagine. There is not an external impression, be it made upon what part of the body, it may,—there is not an emotion of the mind, there is not a change in action, in the atmospheric air, in the state of the body with regard to health, and not even a local injury or change, let it be ever so slight, which does not produce some change on the action of the heart, in power, in rapidity, or in both; and from what part soever this affection of the heart may come, brief time elapses before the heart communicates it all over the system. It may happen that the primary derangement of the system is that of an organ which is in itself as insensible to outward impressions as the heart is, and which is only local in its proper function; but this tells on the heart, and through that upon the whole system. It may be that some external part is excited to diseased action, and this instantly tells in a hard and quickened pulse at the wrist: or, it may be that some such part is languid, and inca-

pable of the right performance of its function; and then the pulse at the wrist is languid and irregular.

This power which the heart has of distributing either a morbid excess or a morbid deficiency over the whole system, is of the greatest advantage to us; and the advantage is much increased by the fact, that it is all done without our knowing any thing about the details of the matter. If we always knew the internal state of our own bodies as well as we know the state of that external world which is palpable to the senses, we should be incapable of thought or of action, and our lives would be insupportable. Thus, it is impossible for us to say whether we ought to feel the most gratitude for that which we are able to know, or that of which, from its very nature, we must remain ignorant.

The brain, and in all probability its continuation in the vertebral column, are as insensible in themselves as the heart; and if the coverings and membranes were once divided, and the pain from that division abated, there seems no reason to suppose that any pain would be felt, upon cutting into the substance of the brain, or that the process of thought would be at all interrupted by the abstraction of that very portion of it which phrenologists maintain to be the most cogitant organ of the whole. With the nerves it appears to be the same. Generally, they have not that feeling which in the surface of the body we call touch; and though all the local organs which are peculiarly the seats of the other named senses are copiously supplied with ramifications of nerves, yet the

supplying nerve itself does not partake in the sensation—is not stimulated by that which produces the specific effect in the proper organ. Every sentient part of the body, whatever may be the kind of sensation for which it is fitted, is always supplied with nerves, though it is in many cases, if not in all cases, doubtful whether these nerves can be traced absolutely to that which we ought to consider as the real organ of the sensation; and the nerves are always accompanied by blood vessels as far as we can trace them.

If the whole of the nerves that go to any part of the body are divided, every kind of living action in that part is at an end, whether it be sensation in any of its modifications, or motion; but the very same thing happens if all the blood-vessels are divided; and thus both are essential to the healthy and proper action of the part. But though the division of all the nerves has this effect, we cannot say that any communication is carried on between one part of the body and another by means of the nerves. Some have said that there is a circulation of nervous energy in substance, and some that there is a propagation by a sort of vibrations; but we have no trace of any organization by means of which a circulation could be carried on, and the substance of the nerves appears to be ill suited for any kind of vibration. In every circulation in the body, the truth of which has been in any way established, there is a distinct apparatus of circulation; and this is the case whether the circulation be a complete one, like that of the blood, or an alternation, like that of the lungs in breathing. Without the

action of the chest and the diaphragm, the function of breathing could no more be carried on than the function of circulation could be carried on without the heart.

It does not appear that two different kinds of sensation can be displayed by the same identical sentient part, though they may be, and often are blended together in the same organ. In consequence of this, when there are more than one, one may be destroyed and the other may remain, whether the destruction of that which is lost be by natural disease or by artificial means. Thus, the feeling of pain may be destroyed in a limb while the power of motion remains, or the feeling of pain may remain without the other. What is usually called touch, seems to be, in this view of it, a very complex feeling, or rather an incorrect name for many feelings which have been confounded with each other. Thus we find that there are persons who have a very exquisite feeling of touch, properly so called—that is, of the presence of objects, and the characters of their surfaces; but whose sensibility to heat and cold, or to pain and its opposite, are by no means so acute; and there have also been instances of the total absence of some one of those feelings while the others remained in perfect vigor.

It is of the utmost importance to have a clear understanding of these facts, because they are essential to the proper knowledge of the senses; and we cannot, of course, educate the senses, or use them with proper advantage, if we have not a thorough knowledge of their nature.

We find facts similar to those mentioned, in the cases of all the senses which have local organs. The portion of the eye which is the proper organ of vision is quite insensible to all the complex feelings usually known by the name of touch—the presence of an object, the feeling of pain, and sensibility to changes of temperature. The internal parts of the eye feel hardly any thing of these, and the white and ball of the eye generally not much, though the eyelids, and other parts immediately investing the eye, are peculiarly sensible to them, especially to pain. On the other hand, strong light, which has little or no effect on the common feelings of touch, powerfully affects the eye, considered as an organ of vision. A blow inflicted upon the eyeball, without affecting the surrounding parts, is seen as light and and not felt as pain: a wound in the retina produces the same sensation as if a brilliant pencil of light were flashed on the eye; and if the interior surface of the eyelids is inflamed, the struggle in the turgid capillaries appears, to the shut eye or in the dark, like small irregular lines playing upon a dark ground. It is probable that this, as well as some other spectral appearances within the eye, may be communicated through the white, or even from the parts behind the eye, as well as through the pupil.

The insensibility of the optical portion of the eye to pain and temperature is a very beautiful provision in the structure of that organ. The eye has to keep watch amid all dangers and in all weathers, and therefore it requires to be continually in armor; and un-

less its structure is destroyed, or its view hidden by the other parts, it never shrinks from its post. The surrounding parts, which protect it from those dangers which it cannot see, are remarkably sensitive, but the eye itself is quite the reverse. There is no climate that in any way affects the ball of the eye, either by the severity of its cold or the ardor of its heat.

Though it is sometimes said that the eye can see nothing but color, yet there appear to be different affections of it by different degrees of light, in which color has very little concern, if indeed it has any at all. There are some remarkable compound effects resulting from the action of direct and reflected light upon the eye at the same time, especially if these are, as is often the case, of different colors; and, besides these temporary differences, which arise from the nature of the light, there are others that arise from the eye, some of which are of a temporary, and some of a permanent nature. These can be noticed with more advantage when we come to speak of the structure and functions of the eye as a principal subject of remark; but we may mention in the mean time, that there have been instances of whole families who had the most correct visual perception of the shapes of objects, so as to design or execute ornamental works with great taste, but who were yet unable to make any distinction of colors when the differently colored objects were of the same size and shape.

It must not, however, be forgotten, that as mere sensations on the eye as a sentient organ—it is highly probable that the only differences are stronger or

weaker feeling; and that the animals, which have no mental process in addition to the mere feeling of sense, have probably no discernment of color. There is one observed fact which, though it may at first seem to make against this, is really a confirmation of it. It is this: cattle are very strongly excited by bright red, so much so that an enraged bullock will stop to gore and trample any red article of apparel, and allow the wearer to escape. The explanation of this does not appear to be very difficult. All eyes that see by means of the same kind of light must be affected by it in pretty nearly the same manner, so far as the merely physical sensation goes. Now, we know from our own case, that when the eye becomes fatigued by long looking at any one color, or simply if long habituated to the color, whether it is fatigued or not, it becomes remarkably sensitive to the complemental color. Red is the complemental color to green; and the eyes of grazing animals are, of course much habituated to the latter, and consequently in a state of great sensibility to red if it is presented to them. Hence, it does not follow from the excitement into which the animals are thrown by the red color, that they have any knowledge of red as a color, but are merely excited by it because it happens to be the color to which their eyes are the most sensitive. This also explains, in a satisfactory manner, the similar kind of excitement into which cattle are thrown at the sight of blood, and which some fanciful speculators in such matters have attempted to account for upon the ground of a sentimental horror of slaughter on the

part of the animals. Sentiment, on the part even of human beings, is not unfrequently rather a questionable matter, as it is sometimes imputed and at other times affected; but when we find it attributed to the animals, we may always be sure that it is a mere imputation, for which there is not the least shadow of a foundation.

How the animals which have no mind and therefore no faculty of reasoning, manage the refractions, parallaxes, and other optical deceptions, by which we are so liable to be imposed upon if we do not understand their nature, we have not the means of ascertaining with any thing like absolute certainty; but the probability is, that as they have none of the advantages of mind, they are also exempted from the disadvantages. This is, however, only an incidental matter; but still it is one of some importance, inasmuch as those races of mankind which have the least mental developement have always the most ready and exact use of the senses, and especially of the eye, just as those who cannot write, or do not practise it, always have more accurate verbal memory than they who keep regular books, and commit every thing to writing.

The sensations of the ear, though they are not perhaps of so striking a character, have distinctions pretty similar to those of the eye. The nerves of hearing and those of feeling, whether of pain or of the simple contact of any object, are quite distinct, and either of them may be deprived of its sensation without any corresponding injury to the other. It so

happens, too, that certain diseased states of the ear, which in themselves emit no kind of sound, have the same influence upon the auditory part of the organ as if they were sonorous. If the arteries are in even a very slight state of increased action from inflammation, and the side of the head is laid close upon the pillow, the pulsations of the vessels of the ear are heard as if they were audible sounds; and in the affection popularly called "singing in the ears," the cause is some diseased action of the interior parts of the organ, which is too weak to produce any sensation of pain, but strong enough for affecting the far more delicate sense of hearing.

If we were to be very precise or systematic in describing the very numerous and variously modified sensations of which the body is capable, we should probably have to arrange them in three divisions:—Sensations of perception, sensations of feeling, and sensations of action.

Sensations of perception are those which furnish to the mind the means of perceiving that there is some object to be known, without any reference to the effect of that object upon the body, either as painful or as pleasurable. The named senses which come under this denomination are chiefly sight, hearing, and touch, in the simplest use of that term—that is, the simple contact of the touching part with some other substance, without any regard to the feeling by which that may be accompanied, either of a pleasurable or of a painful nature, or any wish for the performance of an action. The senses of smell and taste may no

doubt be exercised for a similar purpose, but in an inferior degree.

It is not, however, to be understood that any of these three, considered as a sensation of perception, occupies the whole of the organ,—that every affection of the eye, the ear, or the tactual surface, is a sensation of perception. This is not the case in Man; and in the other animals, though the organ may be more acute than in the human subject, the sense of perception, in the strict and proper meaning of the word, appears to be wholly wanting in it. Thus, the eye of the eagle, and the nose of the dog, are generally understood to be more acute than the same organs in Man; but, in a state of nature, it would be incorrect to say that either of them exercises its keen organ, in any one instance, for the obtaining of knowledge, and for no other purpose. No doubt the eagle can espy the dappled ptarmigan among the lichen-spotted stones from a height at which man, taking a bird's-eye view of things, could hardly discover an elephant; but no one ever supposes that the eagle has any desire to study ornithology: she wishes to eat. The professional ornithologist—especially the British one, with whom science is rated at what it will fetch—has no doubt the same motive at bottom when he quarters the moor or beats the bushes; but still, even he makes a show of knowledge, in order to cloke the inward purpose; and this must be understood as the result of a highly artificial state of society, and by no means natural to Man. In like manner, when the wild dog scents out carrion in the Australian bush, he is moved

by no desire of studying the anatomy of the kangaroo; and as little when the duck quaffers in the mud, or the spider "feels in the thread," is there any desire of knowledge in the one or the other.

The senses of perception may be regarded as peculiar to Man, and to Man as endowed with mind; for we may even go the length of saying, that in Man they are not original, but acquired—the results of the operation of that very mind to the information of which they are to minister. The infant, at the very first, possesses them not: its very earliest sensations are, in all probability, simple sensations of feeling, which in a savage state ripen into sensations of action, while the perceptive ones remain in a very low and imperfect condition.

Those who are not accustomed to that method of analysis which must be followed out if we are to have any competent knowledge of ourselves, and for the want of which many drawl out the full tale of their years in the joint drudgeries of ancient patriarchs and modern plodders, and go to their graves in utter ignorance of the real purpose for which they came into the world, and their natural endowments for the performing of their parts in it,—those who are thus situated may wonder why there should be more than one sense in the same organ, and in that part of the organ with which the medium of communication is, in all cases, the same. But any one who will reflect but for a moment, must remember, in his own case, how very many different feelings have followed the same kind of exercise of the sense—how many desires and fears,

joys and sorrows, hopes and despondencies, and all other contrarieties of feeling that can be named, have been produced by sights or by sounds; and produced when there appeared to be no absolute reason why the one of them should be excited rather than the other.

That Man alone should possess these senses, in the proper signification of the term, is in itself a very strong proof that Man is especially formed for the acquiring of knowledge; but the proof, from the same source, is equally strong that he fails in his duty if he rests satisfied with mere knowledge, and consumes his days in mere speculation, how diligent and successful soever he may be in that. The sense which is the most generally distributed in the human body—and the one which, taking it on the whole, appears to be superior in Man to what it is in any other animal—is that of touch, considered as a means of knowledge. Many animals possess modifications of this sense, and possess them in a degree so extraordinary that we are quite unable to understand them. The fine filmy margins of the feathers of owls and other nocturnal birds, and of the flying membranes of bats, are instances of this, and so are the whiskers of beasts of prey, and of various other animals. But exquisite as the sense of touch is in them, the object of it is not the acquiring of knowledge, but simply the guidance of the animal, so that it may neither run against objects to its own injury, nor alarm its prey. The horse, too, has a very curious sense of touch, apparently in the general covering of the body, by means

of which he pauses when he comes near a gate or other obstacle, even in the darkest night, when it is quite impossible that he can derive any assistance from vision. In all cases, indeed, in which the other senses of animals are engaged either in conducting them to their prey, or in escaping from danger, the sense of touch in their organs of motion, or on the surface of the body, are sufficient to guide them under all ordinary circumstances; and in this the horny hoof does not appear to be inferior to the padded sole of the foot; but there is not one of these cases in which touch can be properly regarded as a sense of perception—a means of knowledge; for the foot that takes the ground with the greatest security, or the covering which clears the obstacle to a hair's breadth, gives no information as to the nature or even the existence of that to which it is so well adapted. Indeed, it is the very perfection of the sense in such cases that renders the animal adequate to its own preservation, without the assistance of any knowledge.

Man possesses no such instinctive means of safety, —no such means whereby each part of the body that may be exposed to danger, has a self-acting power of preservation against that danger. The human foot can be educated by practice, so as not to stumble on a known path in the dark; but it has no such power in a path untrodden before; and even if unknown obstacles are placed in a well-known path, the chance is that they will be stumbled upon in the dark. Those exquisite sensations of touch in the animals are not guides to action any more than they are means of

knowledge. The simple avoidance of the momentary danger is all that they assist in, and the purpose of the animal, whatever that purpose may be, must be accomplished by other means. Not so in Man; for in him, the sense of touch may be made to supply the place of the other senses in working, and even in the acquiring of knowledge, of which we know many remarkable instances in the case of the blind; and there are many of the nice operations in the arts, where touch has to be called in to continue the work after vision has failed, notwithstanding all the assistance which the optician can give it. It is true that there is something more than mere touch in these cases, and we must refer the actual performance of the process to the sensations of action; but still touch is the guide which puts those other sensations in the way, and it has no such tendency in the animals.

The sensations of feeling, considered merely as such, do not in themselves tend to the knowledge of any object external of the body, or even very definitely to the knowledge of the body itself. In themselves they are simply either pleasurable or painful, and it may be that the latter is the predominating feeling, the one which puts all the train in motion; and that the sense of pain is the grand incentive to all animal action, and to knowledge in Man. It is the painful craving of hunger, of thirst, or of some other appetite, which excites every animal to exertion; and the first movements and indications of movement on the part of the human infant, seem all to be the immediate results of unpleasant sensations. In the very early

stages of life there is only one indiscriminate expression for the whole of these uneasy sensations,—the child can simply cry; and this is the very first indication of life, and probably contributes not a little, along with the causes already alluded to, to begin the important function of respiration. As the repeated exercise of this feeling, and the connecting of it into little trains of associated thought by the mind, gives the infant some knowledge of the parts of its body, the crying, which was at first the only means of expression, is accompanied by convulsive, or at all events indefinite movements of the body; and, after a time, the movements are made without the necessary accompaniment of the crying: then, when the powers of the body are matured, and the extent of them known, the propensity to crying gradually goes off, and if the animal system still continues to predominate over the intellectual, these sensations of feeling are expressed by other actions of the body.

In the animals there is not, in any case, an intermediate process between the sensation of feeling and the bodily action; and from the indolence of the majority of them when they are not under the immediate influence of any sensation, it is probable that they are, in all, or at least in most cases, driven by necessity, and not attracted by the hope of actual enjoyment. Indeed, we may say that this is absolutely and uniformly the case; for, although there is a shadowy sort of hope which nobody can define, yet whenever hope is of so definite a nature as that we can assign it a specific object, it must be to some extent

founded upon knowledge, and thus it can have no existence where there is no mind. When the hound, the horse, and the rider start in chase of the game, the hound starts from the instinctive impulse arising out of his animal feeling, upon which, in a state of nature, he acts for the appeasing of his hunger; but this feeling is trained by the huntsman. The horse, in like manner, starts simply upon that feeling which in a state of nature drives him across the desert in quest of the green spots; and this is also trained. The hunter alone has hope in the chase; and the same capacity of acquiring knowledge which gives him this hope, gives him the means of training the hound and the horse as the means of accomplishing this object of the hope; and the mere circumstance of selecting and preparing means is a marked distinction between the man and his irrational associates in the chase.

The principal object of the sensation of feeling is the preservation of the body, from danger and from want, and from pain of every kind. This is the primary sensation in the animals, whether we refer it to one or to another of the named senses. Preliminary to the action of the animal there is nothing but this, and therefore the action, or the positive effort to the performance of it, depends immediately upon the sensation, and upon nothing else, whether that sensation is produced by something from without, or by a merely unpleasant state of the body of the animal. In the case of the simple feeling of pain, there is an immediate sensation of action, a shrinking or motion

of the part; and it matters not whether the pain is by a twinge of the body itself, or by an impression from without; for, if the fact of the latter is not known by the evidence of some other sense, the shrinking and starting is the same in the one case as in the other.

It is very probable that this pain is felt at the surface only; and there are some cases which seem to prove that it is so when the pain arises from an external injury. When a pike or bayonet pricks the skin of a man or horse in battle, and the excitement of the wounded party is not too great for allowing the wounding to be at all felt at the time, the tendency is to run upon the weapon, even although the wounding is in that case to be destructive of life. Those celebrated but not over-wise men of old, who fell upon their own swords when matters went contrary to their wishes, had no relenting of nature to induce them to stay their hand after the operation was once begun; for as soon as the sword had penetrated their integuments the pain was over, and the natural tendency of the body was to run upon the weapon.

In the performance of surgical operations, it is well known that comparatively little pain is felt after the integuments have been divided. Hence the experienced surgeon takes especial care that the position of the patient shall be well secured until the skin is divided, and he makes the incision in that to the full extent that may be required, and with the greatest possible expedition. This part of the operation, in which only the integuments are divided by the instrument, is of course attended with little danger in itself;

and the precise extent of it is a matter of inferior moment, so that it is large enough and quickly done. When it is over, and the more delicate and dangerous parts of the operation are proceeding, little more is necessary, unless in the case of another painful surface between a sound part and a diseased one, than to prevent the patient from being a spectator of what is going on; for in ordinary cases he will have no more knowledge of it than the young nobleman, mentioned by Harvey, had of the fact of his heart being handled when the outside skin was avoided and his view was intercepted. If, however, the patient shall see the operation going on, he will feel sympathetic pain although there is no pain in reality; and thus no patient should be allowed to watch the progress of an amputation, or any other serious operation in which much use of the knife is required. The author once had an instance of this in the performance of a trifling operation upon himself. A steatomatous tumor had formed upon his upper eyelid, and, in a very short time, it grew to the size of a pigeon's egg, so that, though not painful, it was annoying. He asked several medical gentlemen to remove it; but some declined, from the fear that they would have to divide the tendon which raises the eyelid, and the others from the great pain that it would occasion to extract the whole of the cyst, and the danger of leaving any portion of that remaining. Soon after, he had occasion to call upon a lecturer on anatomy, who performed the operation in less than a minute, without any more pain than the momentary twitch occasioned by dividing the skin;

and every trace of the object of so much alarm was gone, never to return, in the short period of a single day, and with no dressing save a bit of plaster.

As an animal sensation, this feeling of pain in the human subject is both a transient and, in many cases, a trifling one; and if people would employ half the mental care which they bestow upon its needless exaggeration, in calm consideration of the fact of how limited it is in the range of its action, and how brief in its duration, they would bear whatever share they may have to bear with comparatively little uneasiness.

That this peculiar sensation should be common to almost the whole surface of the human body; and that it should be almost wholly confined to the surface, is a very beautiful part of the economy of our nature. It is a protection to us all over,—an armor far more complete, and efficient for far more purposes, than any in which warrior was ever incased, and it is an armor which burdens us with no additional weight. It has this property too, that it is always most keen on those parts of the body in which the feeling of touch as a sensation of perception is most exquisite; and thus, it guards with the greatest vigilance those parts which are the most essential to our usefulness and our enjoyments.

Were it not for this sensibility to pain in the skin, the body would be exposed to continual mangling and injury from every object with which we come in contact; and if a man had, by knowledge and forethought purpose, to take the same care of his person which is taken by this simple sensation, without the least know-

ledge or effort on his part, this labor alone would be a burden, nothing else could be done, and life would be quite unsupportable. Besides the absolute pain, which is the warning in the case of actual mechanical danger, there are a thousand other uneasy sensations of which we get warning for our good by the same property of the skin. It warns us of every neglect in the way of cleanliness, and of many other things, which, if they went unheeded, would become injurious. The sympathies which it has to the states of the atmosphere, though we can neither describe nor name them, are not the least singular or the least valuable of all the admonitions that we receive from this general guardian and adviser of the body. Those influences of the weather, that is, of the state of the atmosphere, upon our "feelings," as we say in the remaining phraseology of our absurd theory, are, one and all, nothing more than influences upon the skin; for, upon the interior of the body—upon any one of what we term the vital parts of our system, the weather can have no effect. These are insensible to pressure, to cutting, and even to burning; and therefore it is impossible that they can be affected by any of those changes of the atmosphere.

Let us consider for a moment the wretched condition we should be in if the whole interior of the body had the same kind and degree of feeling as the skin. The interior is full of motions, and of motions that never cease while life lasts; and if the parts had been sensitive to each other in these motions, there would have been such confusion, of creeping, and tickling, and

tingling, and smarting, that we could have attended to nothing else; and when we moved our arm and fingers, our attention would have been so occupied by the feelings in the muscles and other parts, that we should have been quite incapable of directing the hand to any useful purpose. Hence we have equal reason to be grateful for the absence of the sensation of feeling in the interior of the body, as we have for the presence of it in the surface.

The third class of our sensations, or those of action, may all be resolved into one which is much more general and definite than our sensations of mere feeling. This is *the muscular sense;* and though it is but lately that it has been named and described, and can scarcely be said to have yet obtained the place which it ought to occupy, it is probably the most valuable and important of all the senses of the body,—the one by means of which all the rest communicate with each other,—the grand instrument in the acquiring of knowledge, and the only one by means of which that knowledge can be turned to any practical account.

This sense is common to Man and to all other animals, even to the oyster which is cemented to the bottom of the sea, and then has not the slightest power of motion from place to place; for the oyster can open and shut the valves of its shell, and though one of these motions may be performed by the reaction of an elastic ligament, two antagonist ligaments, whatever may be the degree of their elasticity, cannot *begin* a motion, or continue it beyond a given length of time. If this were possible by means of them, those

observers who dream about the discovery of a machine of perpetual motion, would not dream so utterly in vain as they have hitherto been destined to do; for the impossibility which now meets them in the principle of the motion would be reduced to that of finding perpetual materials whereof to construct their machine. This would still, no doubt, be fatal to the perpetuity, but not to the motion; and thus the projector would be enabled to rejoice in the workmanship of his hands during the whole term of his mortal life, whereas, in the present state of things, his cabinet can show nothing save the wonderful ingenuity of his failures. But the two ligaments, how violently soever we set them to work against each other, very soon come to a state of quiescence by mutual consent; and, therefore, we are unable to hold out any new hope for the dreamer.

The muscular sense is, like the other senses, quite unconnected with feeling, and may be in continual operation without the party being in the least aware of it. This happens constantly in the heart, in the arteries, and in various other inward parts of the system; and thus this sense is not in itself a *source* of knowledge any more than the other senses. The action of a muscle—that for the originating of which it is specially constructed, is motion, and the succession of this motion, expressed in the muscular feeling or sense, is the foundation of our knowledge of extent in space and succession in time, and the only means by which the perceptions of our other senses are con-

nected with the realities of the external world, or with the existence and form of our own bodies.

In the animals, this sense follows immediately upon the sense of feeling, whether that is excited by local organs, or by injury or pain of any kind; and the action of the muscle follows immediately upon the exciting of the sense of that muscle. It is this which is called *instinct* in the animals; and it is so called because the muscular action, which is the final effort of the animal, is all put out by, or grows out of, the present sensation, without reference to any thing that went before, or is expected to come after: that is to say, the animal is guided by no experience, and proceeds according to its plan; and by being competent for all its purposes without these, it does not require mind, and does not possess it. What has been sometimes called reason in animals, being nothing more than that the animal has a more complicated part to perform than some other animals, and its sensations and muscular actions are more numerous accordingly, but the instinct is as perfect in the one case as in the other. The borings of the ship-worm, under water and in the dark, by an animal which has no eyes or ears, and no use for them, are quite as clever as the labors of the beaver, about which we have heard so much; and the part performed by the coral insect—a diminutive creature which cannot be seen by the eye—is vastly more conspicuous in nature than that performed by the elephant. The little things work in myriads, and build islands in the ocean: the ele-

phant has nothing to leave but his bones, to swell some heap of mud and rubbish.

It has been doubted whether the muscular sense ever acts in Man so as to produce muscular motion without the interposition of mind; but the doubt is unfounded. Persons of exclusively intellectual character, who neglect the body in attending to the mind, and persons who neglect both body and mind, have this sense in very imperfect exercise; and the recluse of the closet and the mere clown are equally conspicuous for not "bearing their bodies seemingly" as they move about. They dodge and roll, and fatigue themselves by raising and lowering, and rocking about the centres of gravity of their bodies, so that a few miles of walking exhausts them far more than it does those who have cultivated this sense, and can carry the weight of their bodies smoothly along. Old soldiers, if they have escaped mutilation, are a long-lived and fast-walking race; and there is no doubt that they owe much of this to the care with which they are drilled into the most advantageous positions and motions of the body. Men who are exposed to the free and pure air of an open country ought to live long, and be erect in their old age; but such is not the case, for they are not trained in the "bearing" of the body, and thus they wear themselves out by the labor which they take in moving the weight of the body ten times as much as is necessary. A truly graceful posture of the body is always an easy one—at least after a bad habit, previously acquired, is corrected; and it will invariably be found that those who go about any

bodily labor gracefully, perform it better than the awkard, and with much less fatigue. Even at the writing-table, much depends on the attitude. One who places the chair far from the table, puts back his heels under the chair, and brings forward his body leaning on the elbows, till the profile of his figure is like a Z, is as fatigued after a few hours as if he had been performing labor; whereas one who knows how to sit at a writing-table may continue twelve hours or more each day, for weeks, without suffering the least in his health, or feeling the slightest inconvenience.

All the balancings of the body may be regarded as depending on the muscular sense, with little or no assistance from any of the other senses, though, when they are studied, there is of course something of mind in them; but if this sense, and the action of the muscles which naturally follows it, are not destroyed by awkward positions of the body in early life, the care which they take of the attitudes and safety of the body, not only without any mental purpose, but without any knowledge, are very remarkable.

This is a subject which is by no means attended to as it ought to be in the training of human beings. In many instances, the dancing-master is the person to whom this part of the business is committed; but any one who looks at the gait of a dancing-master, a figurante, or a rope-dancer, in the streets, will want no ghost conjured up to tell him that this is not quite the training that is required for a graceful, a vigorous, and a long-lived people.

A care of the body is shown in the muscular sense

of infants, long before there can be any mental knowledge, which last is, of course, derivable from experience only. The action of the different parts of the mouth, which are requisite in obtaining for it that nourishment which nature prepared, is scarcely less intuitive than respiration, the circulation of the blood, digestion, or any of the other vital functions of the body; and surely no man will say that the mind has any thing to do in the case of these. The blood must circulate, and various other important functions of the system must be carried on, long before the mind is at all aware of the existence of the body; and the knowledge of any one of them as a philosophic truth, contributes not a jot to its better performance in the philosopher's own system.

In the early stage of existence, there are some remarkable indications of that care which the muscular sense afterwards takes so readily and so unbidden in maintaining the stability of the body. The human body is admirably formed for stability upon the posterior extremities, in the feet and limbs, the articulations of these with the body, and the form and organization of the body itself; but something more than this is requisite in order to insure stability, not only in the actions which the body has to perform when it stands on the feet, but in any still position, be that position what it may. It has often been remarked that stability upon its feet cannot be given to a statue, even though it is a model of symmetry in all its parts, and that attitude which is known to be the most stable in man is given to it. To make it stand

at all, is a matter of some difficulty; and it cannot be so placed as that a very gentle wind from some quarter shall not lay it end-long.

Now, why should this be? Why should the human body stand firmly upon its feet, even though it is no model of symmetry, while the statue which has, in form, the strength of a Hercules or the symmetry of an Apollo, tumbles on the least agitation of the atmosphere? This question is easily answered. The statue has but one centre of gravity, and when that is so shifted as that the perpendicular through it to the centre of the earth falls in any way without the base of the statue—that is, without a figure formed by lines joining all the external points of the feet upon which the statue rests—down the statue must tumble, with all the passiveness of a lump of matter of any other shape.

The human body, on the other hand, has a muscular feeling of the centre of gravity, in consequence of which, if that centre is so much to one side as that the position is beginning to become unstable, the motions and flexions of the limbs instantly shift the centre of gravity, or rather shift the attitude of the body so as to accommodate it to that centre. Suppose, for instance, that the feet are in any position; then if, as already mentioned, all the extreme points in which they touch the ground are joined by lines, the figure formed by these lines will be the base upon which the body is supported. Suppose again, that this figure is cut out in a piece of board, of equal consistency and weight, inch for inch, in all its parts, there is one

point in this board upon which it could be supported perfectly level upon the point of a pin, and this point is its centre of gravity. If the shape of the board were known, this centre of gravity could be found with no great trouble, as it is the point through which *every* straight line drawn across the board must divide the said board into parts of equal weight: but we are speaking of any position of the feet, or of one foot, or of a heel or a toe, or any position of a foot upon which the body can be supported; and, therefore, the determining of the centre of gravity for any one figure would only confuse us. So, let the figure be on the ground, and its centre of gravity known, and let a perpendicular line be supposed to be drawn upwards from this centre of gravity, and passing through the centre of gravity of the body; then the body will be in the position of greatest stability which it can have with the feet in the same position. The centre of gravity of the body is somewhere in the height of it, varying a little with the form; and if this centre is kept in the perpendicular, the body will always maintain the position of the greatest stability, whatever may be the flexures or motions of the other parts; or the centre of gravity may move so as to be over any one point in the base, and yet be stable, only the stability will always be less the nearer that the body is to one side of the base, and the farther it is from the opposite one. The number of positions which the body can assume while on the same base of the two feet is almost beyond the power of arithmetic; and as the positions of the feet themselves may be also greatly

varied, the command which we have of the body by means of our power of working it upon its centre of gravity is almost incredible, unless by those who have studied the matter with the greatest attention.

There is no animal which has nearly the same variety in the command of its body, even though the feet upon which it rests should be clutching or grasping ones; and when the animal has to stand on all-fours, the positions are still more limited. This command of the body in man is in itself a clear proof that he is organized for doing something more than any other of the inhabitants of the earth—something more than is required for any imaginable purpose in wild nature; and this is an irresistible proof of the fact that the human body must be organized for the accommodation and use of something not to be found in the whole range of material nature, whether organized or not. There is nothing in the material world at all worthy of such a body; and therefore the body itself, if we study it rightly, demonstrates the existence of the mind, and demonstrates it by those actions of the body in which the mind may be said to have no share.

All those motions and balancings to which we have alluded depend upon the muscular sense, and upon that only; and though they are so extremely varied, we have taken the very simplest case by means of which any illustration of them can be given. We have supposed the feet to remain at rest all the time, and we have made no allusion to the senses which have their organs in the head as observant, the hands as

acting, the features as expressing, the mouth as speaking, or the whole attitude and gestures of the body as giving force and effect to that which is spoken. Combine these in all the variety of which they are capable, and then multiply the combination by all the varieties of motion in place which can be given by the feet without interrupting or interfering with any of the others, and then say, where shall language be found to express that of which the human body is capable?

In all this, too, we are alluding merely to the uneducated body,—not to the body as it is trained by the help of the mind, but to it simply as it is prepared—as the organic structure, by means of which the mind is to perform its still more wonderful operation. The consideration of the educated body, or of its education, does not properly belong to the present volume, because, without the mind, admirably formed as the body is, there can be no education even of it. All that we have stated, and much more than it is possible to state, belongs in full perfection to the rudest savage of the human race, ere yet he has bended a bow, pointed a spear, or even rubbed two dry sticks against each other, and thereby kindled a fire. These operations, simple as they are, have mind and contrivance in them, and we are alluding to nothing but the body; but when, by the proper education of both parts of our compound nature, these parts are made to act together with their full effect, what a study is Man, and how all other terrestrial subjects that can engage our attention sink into nothing in comparison! In our volume on "Intellectual Man," we shall be able

to carry this most interesting subject one little step farther—to exhaust it, or do justice to it, would be altogether impossible.

In what has been stated of this muscular power in the simple fact of preserving the balance of the body in a countless number of positions, we have not made the slightest allusion to knowledge; for all that we have stated is done, and done just as readily and as perfectly, by the man who never heard of a centre of gravity, and who knows nothing about the name or the existence of a muscle, or any thing more about the structure of his body than what he sees: nay, even though he is blind, and deaf and dumb, and has not the least distinction of odors or of tastes, he can do it as readily and as perfectly, and probably more so, than if he were the greatest mechanical philosopher and anatomist that ever lived.

This care which the body can take of itself is independent even of the knowledge that the body exists, for the other animals have it, in that degree which their habits require, as well as Man has; and, as we have had occasion to mention there is no reason to believe that they *know* the fact of their own existence, any more than the same fact is known by a vegetable or a stone. It is a sense, and a more important sense in the general system and economy of the body than any of the five senses which are usually named. It shows itself in infants before they are capable of giving any signs that they can make use of the senses of observation. It is by means of this that they acquire the knowledge and use of their limbs. The

hand of the infant is brought to the mouth before the fingers have learned to grasp; and after they have learned this, whatever they can grasp is attempted to be brought to the mouth, and if they cannot succeed in this attempt, an effort is made to bring the mouth to that which is grasped. All this is done before the eye can be observed to notice or fix itself upon any object, though from the very first, there is a sensibility of the eyes to light. The care of the body, by means of this sense, also begins at a very early period of life; and from the circumstances under which it is displayed, it cannot possibly be the result of experience, or of danger perceived by any of the observing senses. There seems, in the early action of this muscular sense, a feeling of the direction of gravitation, which almost tempts one to believe that Newton's grand discovery might have been made, or approximated, at any time, if philosophers had been wise enough to take infants for their instructers, and sought information by the only means which are efficient for obtaining it—careful observation. How far soever an infant may be free upward or laterally, it shows no apprehension of falling in any of those directions; but if it is unstable downwards, it makes some little effort towards saving itself, how few and rudimental soever may be the motions of which it is capable: so also, if it is tossed or carried upwards, even with considerable velocity, it shows no symptom of alarm, but if it is allowed to feel a descending motion, though far more slow and gentle than that by which it is raised, it exhibits efforts for self-preservation, although

all too young for having any distinct knowledge of external things, or of direction in space as a measurable quantity one way or another.

Remarkable as this muscular sense is in the power of preserving the body under such circumstances as those that have been mentioned, it is incapable in itself of acquiring any knowledge of the external world, or of acting in concert with any of the other senses; for though pain is probably the first of all our sensations, and certainly the first of which we are capable of giving any expression that can be understood, there is no effort made by the very young infant to remove or shrink from local pain. If a pin, unwisely put in any part of its dress, shall lacerate its flesh, or if, as is sometimes the case, a surgical operation shall be necessary, the child, even if instantly born, will show symptoms of uneasiness, by crying and convulsive motions of the body. But these indications have not the slightest reference to the seat of the pain; and no effort is made by the part to shrink from the instrument, or by the mouth to reach it, although the mouth should previously have been used for that natural purpose to which it is obviously directed by instinct, without the least assistance from or connexion with any thing mental.

Our muscular sense is thus our first tutor; but the extent to which it can of itself carry our education is very limited. From what has been remarked, and the remarks are easily verified, it cannot of itself communicate with any other sense; and beyond the simple fact of taking food, which is purely animal and instinc-

tive, and as much a part of the vital process of alimentation, as digestion in the stomach, or any other stage of assimilation, it makes no effort whatever, until the other senses, or some of them, are in exercise, and a connexion is established by means of the mind. Even the single effort to use the mouth is objectless, or without discrimination, and this continues for some time after it can use both the hand and the eye. The feeling of gravitation, though evinced by convulsive motions at a very early stage, is never accompanied by any effort to prevent falling until the education of the body is considerably advanced.

In the young of the animals the progress is very different. These come into the world in very various stages of developement, some of them much less developed in their bodies than the human infant, and others so far advanced that they are instantly able to shift for themselves; but whatever may be their degree of developement at the beginning, the whole of their system, so far as it is necessary for their own personal safety and support, comes forward together. They never make any mistakes in their food, or in any thing else, and though a longer or a shorter term, according to the species, is necessary for the full developement of their muscular strength, and the other parts of their organic system, the instinct is never behind the developement, but rather in advance of it. The young of the ox, for instance, butt with the head before they have any horns; and many other animals display the instinct by which parts are used, before those parts have made their appearance. So far from

their requiring any teaching in the natural use of any of their organs, the instinctive use of the organs appears to come first; and, however curious or complicated the organ or its purpose may appear, the instinctive application of the organ to the accomplishment of the purpose is just as perfect as in those cases which we consider the most simple. The bee builds her cell, the spider weaves her snare, and the ant-lion prepares his pitfall, upon the same model, and with the same accuracy, in one generation as in another. No teaching is required, and the solitary insect, which has never seen, and never will meet with one of its race, is just as efficient at its labor as the one which belongs to a colony of millions.

How different from Man! Abandoned at the moment of his birth, or even after the knowledge of the body and of the external world was partially acquired, he would inevitably perish; and though we have no instance of Man in that state, yet if his life were preserved, and he were to grow up in wild nature, solely dependent on his own personal acquirements, he would be the most wretched of animals,—the most imperfect and helpless thing upon the face of the earth.

Although, therefore, the body considered simply in its structure, and in the very limited instinctive use of sensation, is wonderful, yet, if we were compelled to stop here, it would be a melancholy and mournful wonder,—a sad failure in the midst of a world in which all else is perfection. To use a homely illustration, our going to the contemplation of it would be like

going to see the wheels and levers and other combinations which a maker of a perpetual motion or any other impossible machine had put together with the most consummate symmetry in the form and labor in the finish of the several parts, but in which the principle, by which alone the parts could have any value, were wholly wanting. According to the fable, Prometheus succeeded, by terrestrial means, in completing the bodily organization of the man which he made, but he had to rob Heaven of the sacred fire before his man could perform even the humblest action. It is even so with us; give us simply our body, curious as it is, and the few instincts which we possess, and assuredly, though happily we should not know our own misery, we had better not be.

We may not, dare not, attempt to draw the picture, and fortunately for us—as it would curdle our blood and fix us in death—we are spared the sight of the original; but there are approximations; and it were well that they who affect to deny the mind, and who treat the doctrine of immortality as a dream, and the word and promise of the Almighty as an imposture, should take that as the subject whereby to demonstrate the dignity and perfection of merely physical Man—the *chef-d'œuvre* of material nature, the perfection to which the "organizing affinities," and the "polarisations of material atoms" have toiled through all the gradations of inferior being.

We must not seek for this on the couch of the dead, whether the spirit has untimely departed and left the body in its symmetry, or whether the latter has been

worn to the grave; for though the sight there is mournful to the eye, the lesson is cheating to the mind; and perhaps the doctrine of life and immortality is never more eloquently preached than by that dead body of a friend over which we stand with streaming eyes.

But go to that gloomy abode in which the unfortunates of our race are hidden from the mockings of the wicked and the moralisings of the sentimental. Go to that distant ward from which issues no yell of the maniac, and no laugh of the idiot. Go where lies the depth of fatuity, in which every cord is broken between the body and the mind, even that one which made the internal part of the physical machine work while yet in the dark abode where it originated. Go with confidence, for there, if you can bear your own feelings, you have nothing to dread. There no manacle is wanted, no keeper is required. Approach that thing on the straw: it has some remains of human shape; it lives, it breathes, and it can digest the food which is put into its mouth. It has legs and arms, but they move not, or if they do, their meaningless motions affect you more than their stillness without repose. You never saw a human being lying in that attitude—tumbled down as though it were a cast-off garment or a broken potsherd. That hand is clenched, and has been so till the nails have grown through the palm, and appear on the back; that other finger has been on the stretch till it cannot be bent; but the one grasps nothing—the other points to nothing. The jaw hangs down, and the tongue is lolled

out, but no sound even of air escapes from the melancholy portal. Those eyes see not; those ears hear not; and though the heavens and the earth were commingling in one ruin, not one of those features would be disturbed. All is passive; there is no command, no restraint, no feeling of existence:—But the heart sickens, and we must return. The very tide of phrensied mania, gnashing the teeth through the grating at you, and tearing the flesh from its own bones, is a relief after such a sight.

Go now, and boast of the dignity of the merely animal nature of Man; for this is Physical Man, not in absolute purity and perfection certainly, for there is yet life; but it is Man in a state in which no one member of the body has ever received the slightest education from the mind—Man, with all his instincts, as he was born, and probably as well organized at his birth as the foremost man of the time; but, left wholly to the resources of the body, they have reared him up to this. Disease could not have produced this; for if the mind has once had any educational effect upon the body, that effect can never be wholly obliterated; and when you turn from this extreme specimen of born fatuity to

"The moping idiot, and the madman gay,"

you feel as though you were brought into the society of a philosopher and a man of the world.

Such is the conclusion to which our speculations must of necessity lead, if we consider Man only as a physical being; and such would have been our own

condition if we had not been endowed with mind. This is certainly not very flattering to any man's pride, and it involves a very sharp reproof to those who spend their whole time upon the body, and leave the mind neglected; but it is a view of the matter by no means unwholesome in respect of instruction, and it is absolutely necessary to carry our consideration to this, in order that our knowledge of Man may rest on the proper basis.

I am aware that this is not the usual method of considering the subject, or of speaking concerning it, even in those courts which have the control of those who have lost all control of themselves. The blame is laid upon the mind. Of "unsound *mind*," "*mentally deranged*," or "out of his mind," are the common expressions, whether the disease be mania, idiocy, or fatuity. But they are all wrong; and if it could be shown that there had been one instance of a diseased or deranged mind, then the existence of the mind is not true,—immortality is a vain dream, and religion is a mockery,—morality and decorum are absurd, and laws are most iniquitous restraints upon the natural rights of mankind to catch what they can and how they can. This is a sorry conclusion to the doctrines preached every day in the high places; but it is the only one of which these doctrines admit.

CHAPTER VII.

SENSATION.—PARTICULARS OF SOME OF THE SENSES, AND THEIR CONNEXION.

Some of the senses are so important in themselves, so curious in their organs, and have been the causes of so many mistakes and errors, that a short notice of them is an essential part of the physical description of Man, even in the most light and popular manner in which it can be treated. But before proceeding to them, there is one point connected with sensation and animal feeling of every kind, whatsoever it may be called, which is especially worthy of our attention, as meeting, and tending strongly to rebut, a doctrine which has been brought forward in almost every age, though under very different forms. We believe that the doctrine as at present in fashion among those who feel themselves obliged to say something, but do not know very well what to say, is called, or should be called, "*The doctrine of developements.*" The whole of it has not yet been "developed" in any system by one author, but there are scraps of it here and there,

which, taken in their order, establish a very regular succession, and show how these philosophizers fancy they could make worlds, and people them with all ranks of being up to Man inclusive—if they had materials to their mind, and length of life to work them properly. Such as are acquainted with the subject, and its progressive history, will not fail to perceive that this is really nothing more than a modern "developement" of the old doctrine of Epicurus, which flows so sublimely incomprehensible in the matchless versification of Lucretius. The "elementary particles" of the modern system are much the same as the "seeds of things" of the Ancient; only he takes up the subject when it is a little "developed," so that different things have different seeds, while the moderns begin at the beginning, and make all things out of one common matter, by means of the properties of that matter alone. Further, Lucretius only assigns the gods a state of luxurious idleness—allows them to retire, as it were, while the moderns dispense with them altogether. This being mentioned, let us proceed with our "developement."

The first thing is to get a world—a globe, as the ground upon which all the rest is to be done. Now, the regions of space contain a certain something called "primordial matter," which is so rare and filmy in its substance that no eye or instrument can detect it, and even the sunbeams, which make known our atmosphere, do not tell upon it. This consists of particles far more minute than the globules of blood in the smallest of the microscopic animalculæ—so

minute, indeed, that there is nothing in which they can differ, and thus they are all exactly alike. Notwithstanding this, the two sides of each of them are not quite like each other, or, to come nearer to the purpose, they are not entirely of the same mind. If the one has a tendency to go north, the other has as great a tendency to go south; if the one east, the other west; and so on, always to opposite points of the compass. This sets them a-whirling round; and although they are so very little, they are withal so numerous, that their whirling causes no little disturbance, though a long time elapses before they make any appearance. This is, however, a beginning, such beginning as it may be called; and the reader will not fail to observe, that it takes for granted the two essential parts of creation—the creation of matter, and the creation of action, thus substantially admitting on the whole that which they are inclined to deny in the detail.

The whirling goes on, and as in the course of it one always impinges upon another, the two sides in contact are two against one to each of the other two. The consequence is, that the two whirl together, and soon get a third, and so on. There is no reason why this contact and gathering should be confined to one part of space rather than another. Thus a number of these little collections are made, though each of them is still smaller than the particles of any of the component parts of our atmosphere. No matter,—they whirl away, and the same contact takes place, and is attended with the same results as in the single atoms.

Thus, a filmy thing is at last formed, which is called a *nebula*, and may be seen by the help of a good telescope.

This nebula keeps whirling on, and the parts get more and more in contact till a *nucleus* forms in the centre of it; and then the whole appears as a bearded star. The distant parts keep at a distance, and form smaller nuclei of their own, but too minute for being even seen with the assistance of the telescope; and tertiary nuclei are in some cases formed round the secondary ones. We need not say that this is the framework of a system, consisting of a sun, and planets, and satellites, which wants only a little more whirling to consolidate the whole and make it fit for new purposes. Such is the way in which the "developement" gets a sun and planets, and when these are obtained the major part of the work is finished.

It would be too tedious to run over the whole of this process, or to endeavor to ascertain when the whirling, which still continues in the masses, gives place to other "developements" in the details, though it is certain that, from gas, through the inorganic liquids and solids, and the plants and animals, up to Man, there is a regular progress, which may either go the whole length, or stop at any particular stage. The real process is not known; and thus we may as well retain the notion of whirling as a figurative one, as it is the first part of a process, and certainly "a neater way of doing business" than Lucretius's downward motion of the atoms, with a little incomprehensible "squint" from the perpendicular. We shall not stop

to inquire how a liquid becomes a rock, or a rock a plant, though it seems that this is an accommodating stage of the developement,—inasmuch as it depends upon how the wind blows whether the plant shall be a lichen in the air, a conferva in the river, or an alga in the sea. Neither shall we notice how the first gets on till it becomes a duck, the second till it is a salmon, or the third till it is a whale; but we may give a guess at the progress from mutton to Man. A dog may be taken as the intermediate developement; and this is so far justified by the partiality of the dog for mutton on the one hand, and for Man on the other. Well, an indefinite number of developements—whirlings—bring us to the sheep, and the sheep eat turnips; a few more develope the dog, and he eats mutton; a few more still develope Man, and he eats both the mutton and the turnips. How many more whirlings may be necessary in order to develope a philosopher capable of inventing or appreciating this theory, we pretend not to know; but it has been done, and so we must conclude that it has been done "in some way."

It is by no means easy to maintain a grave face upon a subject of this kind; and perhaps the best treatment of it is a little lightness of expression. But in reality it is no laughing matter; for it is from beginning to end the doctrine of materialism in its most malignant and inveterate form, or "type," as the abettors of the system would call it. *Our* astronomers, at least such of them as are worthy of the name, are above such matters; for the science of the heavens is too ample and too clear for being clouded

by such hazes; but not a few of our men of system in the matter of plants and beasts, are of more humble capacity, and therefore they are apt to develope much of the doctrine without being very well aware of the consequences; and as their books are more easily read than those of the astronomers, they are more likely to do mischief.

Now, if it were true that all plants and animals, including Man himself in the number of the last, were produced or producible out of one common matter, by means of principles or properties inherent in that matter in its most simple and rudimental state, and that this matter would run the whole round in all cases, if not arrested by circumstances at some particular stage, then all distinction would be at an end, and mind itself would be nothing more than a certain polarisation of matter, to be as completely obliterated when the state of the matter changed, as the solidity of a piece of coal is when it is wholly consumed or converted into vapor and gas by the action of the fire. But if it can be shown that sensation is not a property of matter, and could not be produced by any material combination, then the very same proof would be still more conclusive in the case of mind.

It must not be supposed that this would be proving too much, and rendering mind unnecessary, by showing that sensation is not a property of matter as such; for the doctrine of immortality, and even that of acquiring knowledge and retaining that knowledge in the absence of the subjects from which it is acquired, do not rest on the mere fact of not being properties of

matter. Electricity, though unquestionably not matter, in any sense in which we can use the term, is as obviously not a property of matter; neither is light, heat, or life, animal or vegetable. All these are action, or modifications of action; and it would be absurd to say that either a property of matter, or matter itself, is, or can be, action, or that action is, or can be, a property of matter. The matter of an animal is exactly the same the moment that the life of it is at an end, as it was the moment before, and the properties of that matter must also be nearly the same after the lapse of so very short a time; but all action, and sensation among the rest, is at an end.

Besides, the notion of a quality of matter does not depend on the quantity of that matter, but is equally diffused through the whole of its mass, and the smallest portion partakes of the quality as well as the largest. As little has the form which matter may be in, any connexion with the qualities of that matter, whether that matter be simple or compound according to our ordinary modes of expression. Organization does not change the qualities of matter, because, though we sometimes speak mysteriously about organization, it simply means a number of parts applied to each other according to some definite plan of arrangement. If we get matter which can act in any way, it must be capable of acting in all parts of its substance; and in like manner, if action is to be originated by the fact of matter being organized, all parts of the organization must be concerned in it; or if not, the action must be originated in the same man-

ner, without the useless parts, as with them. Upon these principles,—and they are very obvious ones,—no action which is confined to a particular organ, and especially no action which is confined to a surface, can be the result of organization.

We have, in the preceding chapter, endeavored to show that feeling is confined to the mere surface, or at all events to the integument of the human body. The seat of the muscular sense cannot be so well ascertained, because this sense is not known except by the muscular action which accompanies it; and though, by means of some applications, such as that of a galvanic circle, contraction or motion can be produced in a muscle after death, yet that proves nothing with regard to the muscular sense of the living animal. It is not the contraction of the muscle upon any thing being applied to it, or indeed the contraction of it at all, which we wish to ascertain: it is that sensation which induces action, not in one muscle merely, but in many muscles,—not only without the application of any artificial stimulant, but without the wish or even the knowledge of the person for whose safety the warning sensation is given and instantly obeyed by the muscles. We call this sense "muscular," because it immediately brings the muscles into action, and brings them with a precision which no knowledge and purpose could effect, and not from any knowledge that we have of the seat of the sensation which gives the warning. Thus, we cannot tell whether that be a surface action or not, or what part it is which gives warning to the whole

muscles that the body is off its poise, and requires their aid in order that it may recover itself.

The sense is not the less valuable to us in consequence of our not knowing in what it is situated or how it acts, any more than the circulation of the blood is less valuable to those who are ignorant of the manner in which it is carried on, or of the fact of its being carried on at all. It is very general, and, if the case require, very powerful in its effects; for if one who is walking along and never thinking of the matter, stumbles in the street nearly to a fall, the muscular effort, though soon over, produces much agitation and heat in the system. There is also some reason to believe that it acts better when we have no knowledge whatever of its acting; for there are many well-authenticated instances of sleep-walkers keeping their balance with perfect security in situations into which no person would venture awake.

The senses of seeing, hearing, smelling, and tasting, and also touch, in that modification of it which enables us to know the differences of the bodies touched, are surface actions, that is, they take place at surfaces, and at surfaces only, though there is, in the case of the exposed ones, a protecting covering over the immediately sentient surface, without which covering the sensation could not be borne; and in the case of the ear—violent and sudden addresses to which startle us more than in any other sense,—the nervous filaments, whose surfaces appear to be the immediate seat of the sense, are bathed in a fluid, which both keeps them in finer condition than if they were in the

air, and muffles the sound. The fluids of the eye probably in part perform the same office; and the olfactory passages, and the organs of taste, are also kept lubricated with moisture. So much is this the case in the last-named sense, that when we express the strong desire which any one has to taste a viand, we say, in common language, that it "makes his mouth water;" and the saying is in accordance with the fact.

The remarks now offered show in the clearest manner that no living animal can originate from mere combination, and that there can be no progressive developement among animals, whereby one of the more simple orders can ever become one of the more cultivated. Every species is the product of a specific creation continued by the appointed means, and possessing the same organization, the same sensation, and the same instincts, generation after generation; and, though the species has a certain play of character, so that it can change a little according to natural circumstances, and be still more changed by art, yet there are limits which it cannot pass,—and whenever these are reached in any state of a country, the species becomes extinct. Man alone is the exception to this. He can dwell in all countries where he can find food by artificial means. He alone therefore is "the appropriate inhabitant of *all* the earth;" and this is in itself a proof that his artificial operations are guided by a principle over which the physical circumstances under which he is placed have no absolute power. This renders the knowledge of the body, both in its

organization and its sensation, little else than a preparing for the more important knowledge of Man as endowed with mind, the condition in which we find him in nature, and, therefore, the one in which he can be studied to the greatest advantage. But, as the mind receives its knowledge of the external world by means of the senses of observation, and puts its desires and wishes into execution chiefly through the medium of the muscular sense, a knowledge of the organs of the senses and the modes of their action, (the eye especially), is essential to a proper knowledge of ourselves, and a correct jndgment of others.

As our concern is with Man, not as he is known to the anatomist in the forms and arrangements of the different parts of the body, but as he appears to common observation when he is alive and in health, a minute description of the parts of the eye would be foreign to our purpose. The ball of the eye, nearly insensible to touch in itself, is imbedded in parts of extreme sensibility, which have, as it were, the care of it. The brow shades it from downward light, and the tuft of hair upon the brow from small substances falling down. The eyelashes are a further protection against this; and the extreme sensibility of the interior of the eyelids makes them very excellent guardians of the ball of the eye, which is the optical organ. The ball is moved by a very delicate combination of muscles, which instantly turn the opening or pupil of it in any direction that may be necessary; and the expansion and contraction of the iris, which are produced by the action of light upon it, adjust it

to the degree of light with so much nicety, that in a very considerable range of intensities, nearly the same action of light is admitted through the pupil or opening into the interior of the eye. The humors of the eye, especially that which is called the crystalline lens, and which resembles a magnifying glass in form, concentrate the light, and also make the rays cross each other, so that the portion of light which enters the pupil at one side, meets the back part of the eye at the opposite one. A question used sometimes to be raised as to why this inversion of the position of light as it passes through the transparent parts of the eye should not make us see objects in an inverted position. But the question is an unnecessary and unphilosophic one. The parts of the eye through which the light passes before the reversal of the rays have no power of vision, and are quite insensible to light and to every thing else. Thus, the part of the eye which is sensible to light—even if we could imagine that it has the power or the means of knowing the object from which the light comes, or whether the light comes from an object at all, which it has not—can have no knowledge of the light in any other way than as it arrives at itself. If it judges of position at all,—which is more than questionable, it can judge only from what comes in contact with and affects itself. Farther than this, the eye, even though we were to suppose that it has the most perfect capacity for knowledge, which it has not, and cannot by any possibility have,—the sentient part of the eye can know

nothing—as there is really nothing more that comes within the range of its observation.

The sentient part in the back or bottom of the eye can, therefore, be affected by nothing, save what comes to it through the humors; and whatever crossing of rays or other changes may take place in the progress through those, are quite unknown to the eye, with whatever knowledge we may suppose the sentient portion of it to be endowed. Light, or some degree or modification of light, appears to be the only impression of which the eye is susceptible; and, from what was formerly said of the effect of a wound in the retina, or sentient part of the eye, being that of a flash of light, and not a twinge of pain, it can easily be understood, that every effect upon the parts of the eye which are essential to vision only, must be a sensation of light. A violent blow on the eye appears as an instantaneous flash of light; and this effect is produced, not only when the eye itself is struck, but when there is a violent concussion of the head, which we may suppose transmissible to the parts surrounding the eye, and so to the eyeball itself. If one walking hastily and heedlessly in the dark shall strike the forehead violently against a post or any other object, the resistance of which first meets that part of the body, then, instantly, and before any pain is felt in the place which has received the stroke, a flash of light is seen by both eyes, brighter in proportion as the stroke is more violent. Thus, any sudden agitation produced in the exterior coats of the eyeball, from whatever source it may arise, always tells upon

the sentient part of the eye as light, and never as pain or any other sensation.

There is one very simple and easily-performed experiment, which is worthy of attention, as helping to illustrate the very beautiful and somewhat difficult subject of vision. If the finger is pressed, with the eyelids closed, upon the front of the eye, that is, immediately over the iris, it is difficult to produce even the least sensation of light; but if the finger is placed on the ball at the inner canthus, next the nose, circles of colored light are always seen, whether the eyelids be open or shut, and their brightness is in proportion to the degree of pressure applied. At the external canthus, the same degree of pressure has little or no effect in producing the sensation of light. The different effect upon these parts of the eye is worth notice. It is probable that the pressure immediately over the iris has the same effect upon that organ as a sudden and intense light, that is, it makes the sphincter act and close the pupil, so that the impression does not reach the sentient part of the eye. At the external canthus, again, the coats are much stronger and firmer than they are at any other part of the eye, because this is the place at which the ball is most exposed to external injuries. At the inner canthus, the elevation of the nose protects the eye; and therefore the coats do not require the same strength. The sensibility to pressure diminishes from the inner canthus to the external, and of course the firmness of the coats increases in the same proportion, though much more slowly on the upper side, where the eyebrow

forms a protection, than on the under side, where the ball of the eye is more exposed. In this there is an instance of that perfect economy which is so conspicuous in all parts of the body,—the strength being always in exact proportion to the occasion there is for it, so that no part is deficient, or loaded by the weight of unnecessary matter. This holds out a most useful lesson to all who are engaged in the construction of machines; and, were this the place to follow out the details of the subject, it would be easy to show that, in the human body, and the bodies of all animals, the texture of the material used is as admirably fitted to the purpose which it serves, as the quantity.

When the finger is pressed against the eyeball at the inner canthus, the light is seen in the direction of the outer canthus; and in whatever direction the pressing finger moves the ball, or is moved upon it, the circles of light appear to move in the opposite direction; so that the pressure is given at one end of a diameter of the eyeball, and the sensation of light invariably appears to come from the opposite end.

This is a curious matter, and none of the explanations of it which have been proposed is quite satisfactory. It seems, however, that the retina, or that part of the nervous tissue which lines the firmer coats of the ball, is not affected in that part of it which is sentient to ordinary light received through the pupil, but that the sensation of light is felt on the inside of the coats, immediately where the pressure is applied, having precisely the same effect there as if there were a luminous object presented to the eye at the very

spot where the spectrum appears. We cannot suppose that there is any thing resembling the propagation of a beam of actual light from one part of the eye to another, as light is propagated from point to point of the posterior surface of a rain-drop when a rainbow is formed, because, though we do know something of the laws of the motion and propagation of light, we know nothing of any such laws of sensation.

This may convince us that the popular accounts usually given are but ill calculated to explain the structure and sensibility of the eye, to say nothing about the more difficult matter of the sensation of vision, or the still more difficult one of the knowledge of the presence of a visible object.

The common explanation is, that the eye is a sort of camera-obscura ; that the light entering at the pupil is refracted by the lens, and produces an image or picture of the objects before the eye on the retina, in an inverted manner, just in the same manner as the light simply admitted through a lens forms an inverted image upon the table of a camera-obscura ; and that this image is the real object seen. Now, those who say this, never consider that, if the only effect of the eye were to form an image on the retina, another eye would he required to see this image, and that the mode of action in this second eye would be very difficult to explain. The fact is, that there is no evidence whatever of the formation of any image upon the retina of the eye in vision, neither is it possible to imagine the use of such an image, granting that it were formed. What use would there be of the image

when the object itself is before the eye? When we are in the presence of a friend, we do not need to fetch his picture, or examine the image of him in a camera-obscura, to know wether he actually is himself or not. We look at the man, and we instantly recognize him; and we know him also by the tones of his voice, or, if we are very familiar with him, we know the tread of his foot.

It has been supposed that there is demonstration of the formation of this image, in the fact that an image is formed on the retina of an eye, when recently taken from the head of an ox, or other animal; but the image so formed is a common optical phenomenon, and has no more to do with the sense of vision, than the eye of the ox, when removed from the head of the dead animal, has to do with seeing the grass on the meadow or the rest of the herd. The retina is transparent, and forms part of a globular body; and all such substances form images at their posterior surfaces,—as any one may see by going into a chemist's shop and looking at the circular show-bottles in the windows. These give very distinct images of the parties passing in the street; and surely the bottles do not see. The fact is, that this image formed on the retina of the eye is nothing more than an instance of that false and foundationless philosophy so long fashionable in the schools, and not yet wholly exploded,—that we do not perceive things themselves, but merely the *ideas* or *spectra* of things,—a doctrine of which there is not only not any proof, but which is manifestly absurd, in supposing that there are two

worlds,—a world of reality and a world of perception, and that we can have no knowledge of the former, except what we obtain through the medium of the latter. Those who are accustomed to virtual analysis can at once see that this world of perception is, in truth, nothing more than a personification of our perceptions themselves; but the majority of mankind are much less capable of this process of analysis than they ought to be—probably in consequence of the "parrot" way in which they are cramped and spoiled by that ridiculously-absurd mechanical process, which is erroneously called teaching; and, therefore, the error among them is more inveterate and difficult to be removed.

The eye, being much more apparently mechanical in part of its structure than any of the other sentient organs of the body, has been mainly instrumental in putting us wrong upon this subject; and, therefore, it is the best one to use when we endeavor to set ourselves right. In so far as the "humors" of the eye,—the aqueous humor in the fore part, the vitreous humor in the body of the ball, and also the lens, or "magnifying-glass of the eye,"—are concerned, these are certainly nothing but optical instruments; and, in as far as they are concerned, they can be assisted by artificial lenses, such as are used in spectacles, telescopes, and microscopes. But these parts are not sentient to light, or apparently to any thing else. They thus perform a mechanical office, and nothing more; and if their form, consistency, and transparency could be preserved after death, they

would continue to perform their office, and perform it just as well as though they still belonged to a body living and in perfect health. To attempt explaining the process of vision by means of these would, therefore, be no nearer the purpose than attempting the same by means of an opera-glass or a telescope. The artificial instrument, and the natural one, thus far considered, agree with each other in office: they do not enable us to see,—they only enable us to see better than we can do without them. They hold, in short, the very same place in the process of sight that all mechanical helps do in the cases where we use them judiciously: they enable us to work better than we could work without them; but they are useless, unless the principle of working is in ourselves. The shoulder or the mouth may be taught to write, in the case of those who have no hands and arms; but the untaught hand cannot write any more than the shoulder of the same party. In matters which depend wholly upon muscular exertion, we teach the whole body, even when we intend to teach only a single member of it. Thus, the right hand is the only part which is usually taught to write; but if necessary, any part of the body to which a pen can be attached, and which can perform the required motions, can write also. A sense which is confined to a local and specific organ cannot be taught to any part save that organ, and the portion of the organ in which the faculty of the sense is actually seated can be taught nothing but that sense, and in that it of course wants no rudimental teaching, though it may be improved by practice—which is

indeed all that can be accomplished by education of any kind. Hence, if we are to understand the operation of any sense, we must turn our attention to the specific part or parts in which that sense is seated. It is true that, in addition to the actual sentient surface, or tissue, or whatever else it may be, we must also attend to the muscles by which that tissue is worked, or by which the preparing organs, if any, are made to bear upon it; but still the sentient portion itself is the principal subject.

The *retina*, or membrane which lines the ball of the eye, and encloses the humors as far forward as the iris, is unquestionably the seat of vision, and therefore the subject which claims our chief attention. The word "retina" does not mean a "net-work," as is often supposed, but simply that which "holds," or "retains," the impression of the light, from the verb *retineo*, to hold, or keep hold of; and thus it is well expressive of the office of this membrane. It consists of three parts: first, the internal tunic between the other parts of the retina and the vitreous humor of the eye; secondly, the middle or medullary part, which is *supposed* to be nervous matter, and the entrance of the optic nerve into which forms a conspicuous spot in which there is no sense of vision, and which is on this account called *punctum cœcum*, the blind point; and, thirdly, a very fine membrane, which forms the exterior or posterior surface of the retina, which adapts itself very intimately to all the little irregularities in the pulpy mass which lies between the two membranes. This thin membrane, or

the mere surface of it, or the surface of contact between it and the pulpy mass which has been called nervous matter, appears to be the real seat of vision, though the membrane is so thin, and the point at issue so nice, that one cannot speak very decidedly respecting it. In the living subject, all the three parts of the retina are perfectly transparent, so that whatever light enters the eye must penetrate to the posterior surface; and this is at least one of the reasons for concluding that the posterior membrane, or its surface, is the immediate organ of vision. It has been supposed that the optic nerve, which enters the pulpy substance of the retina, transmits the sensation to the sensorium; but both the sensorium and the transmission are hypotheses without proof; and the fact of the nerve itself being quite insensible to light is against the truth of the hypothesis, though not conclusively—as there is nothing conclusive against any hypothesis, but the proof of the contrary of what that hypothesis asserts.

A little spot in the centre of the retina remains transparent after the rest of the organ begins to be obscured by decay in the dead subject; and this little spot is one which is worthy of attention, if we wish to understand how the eye acts in the process of seeing. This point, which we may call the centre of the retina, or centre of the *sense* of vision, is in the middle of the posterior part of the eye, in like manner as the centre of the pupil, or opening in the iris—and which may be called the centre of the light, or *medium* of vision—is in the middle of the anterior part. A line

joining these two points is the axis of the eye, and this line, or axis of the eye, if supposed to be produced outwards to any object towards which the eye is directed, is the line of sight, or axis of view, and the point in which it meets the object is the point of sight, or centre of the field of view—that is, of all that is visible to us in that particular position of the eye.

Our field of view, when uninterrupted, is always a circular space, but it varies in extent according to circumstances: thus it is broader in proportion to the distance when near than when remote; but in this respect it is indefinite, as it depends not a little upon the objects which are in the field. If it is uniform throughout, we see more of it than when there are some prominent objects upon which the eye can rest, but it is also much more tiresome to look at. An extent of flat sand or heath, or even of rich meadow or luxuriant corn-field, has no charm for the eye compared with a scene broken by hills and rocks, and streams and waterfalls, with clumps of trees, and cottages and a church-spire looking over some embowering thicket. So also a picture in which the *chiaro-scuro* is well managed, by throwing both light and shade into masses, has a charm which we cannot find even in a superior picture if it is flat—that is, if all the objects in it appear equally illuminated. No doubt there are secondary or mental feelings which mingle in our general impression upon such subjects; but, independently of these, there is a difference to the eye, felt by that organ at the very first glance.

A cone of light may be considered as coming from

this field of view, the axis of which cone is the axis of view, and the apex or point of it the focus of the eye. The effect of the lenses of the eye is to shorten this cone by bringing the field of view apparently nearer to the eye, upon the very same principle as a telescope appears to bring objects nearer. The reciprocal of the fraction of the real distance, to which objects are apparently brought by the telescope or other optical instrument, is called the power of the instrument: thus, a telescope which represents objects as at one fourth of their real distance, is said to have a power of four, and so on in other cases.

Objects in the centre of the field of view are always the most clearly seen, because the light comes most directly from them and enters the eye in the most favorable manner. Light which falls obliquely upon the eye is partly dispersed by reflection, both at the external surface of the cornea and at the anterior surface of the crystalline lens. In consequence of this, the field of view is never a space of which we can define the boundaries, for the visible gradually melts away into the invisible; and we can rarely examine the field with a steady eye, both because it is very difficult to keep the eye steady without a particular object, and because it is difficult to find a real field of view in which there shall not be some object more attractive to the eye than the rest of the field is. Some have attempted to define the extent to which the field of view can be distinctly seen; but it does not appear that the subject is a definite one, for it seems to be affected both by the distance of the field

and the peculiar formation of the eye. If the field is near we can see more of it in angular distance than if it is remote: at a foot distance, we can see the whole length of an object a foot long, but we cannot see an object a mile long at the distance of a mile. The column of air through which the light has to come to us, in the case of the long distance, robs us of a portion of the light of that object, and substitutes its own light instead; and this is the foundation of what is called aerial perspective.

But besides the difference of the light which comes to us from different parts of the field of view, and the different modifications of it by the instrumental parts of the eye, there is a difference in the sensibility of the retina as the recipient of the impression; and this is one of the most important considerations in the study of the eye. We have remarked that the centre of the retina—the point where the axis of the eye meets it—remains transparent, when all the rest has become opaque and clouded, after death; and this point is also much more sensible to light in the living eye than any other part of the retina. We do not mean to say that there is in the centre of the retina a certain definite spot which is all over more sensible to light than the rest of the member, and beyond which dimness begins at a specific boundary. There is nothing of the kind. The centre is the point of greatest susceptibility, and the faculty gradually lessens as we recede from the centre every way. The law according to which it diminishes has not been very clearly examined, and probably it is one which

cannot be determined, nor would the determining of it be a matter of much importance. The fact itself is, however, a very interesting one, as without this diminishing susceptibility of the retina from the centre outwards, there are many circumstances under which we should hardly be able to see any object.

We shall notice some of these circumstances by and by; but there appears to be another advantage in this gradual change of the nature of the retina. From being a merely sensible membrane of high delicacy at its centre, it becomes gradually less sensible, and acquires something of a muscular character as it approaches the iris; and in the iris itself, the effect produced by light is muscular action. In this arrangement we may observe economy of parts and perfection of the organ jointly obtained; for we have two different sensibilities to light, seated in the opposite parts of this membrane, and overlaying each other in the part swhich are intermediate. The sensibility to light as we approach nearer to the iris, is proved by the experiment of pressing the finger on the inner side of the eye, so as to bring out the circles of light which appear in the opposite part. If the pressure is made as far back upon the ball as possible, the circles or zones of light are very bright; and they are less and less bright, with the same degree of pressure, as that pressure is applied nearer and nearer to the iris; and if on the iris itself, no light appears, even from a pressure much greater than that which produces brilliant zones, when applied far back on the ball.

Now, as this production of light by pressure, so far

as one can carry the experiment without inconvenience, diminishes as the internal sensibility to light diminishes, and must also increase as it increases—which is only stating the same fact the other way—it becomes highly probable, that if we could continue the pressure all the way to the centre of the retina, the light would increase, till, at the centre itself, it would have the appearance of a bright beam entering at the pupil, just as is the case when that part is wounded by a pointed instrument. This does not prove certainly that vision is produced by the impinging of the light on the retina, but it renders the fact probable.

The muscular feeling, which increases in the inner coat of the eye as the feeling of vision diminishes, appears to be an impatience of light, or a resistance of it, or shrinking from it. This is very conspicuous in the contraction of the iris when exposed to strong lights, and also in the fact that a strong light coming obliquely on the eye pains or fatigues it more than a similar light coming directly; and this is of some importance in helping us to use the eye to the best advantage—that is, in making the most use of the centre of the retina.

In doing this there is a double advantage. The centre of the eye affords not only much clearer vision, but vision much less distorted by refractions and parallaxes, than portions of the retina distant from the centre; and the eye is at once converted into an instrument by which distances can be measured by muscular feeling, much in the same way that muscular

feeling converts the sense of touch in the fingers into a measure of distance.

That our having the best view of any object, or part of an object, must be a great advantage to us, requires no illustration, for it is self-evident; and any one can readily revert to instances of the superior information obtained by a front view over a side glance, even with equal wishes of information, and equal time spent in looking. By a "side glance" we do not, however, mean glancing sideways with the eye turned in the head, and the axis directed to the object, but glances in which the axis does not or cannot reach the object, so that a side-light is all that can come to the eye. As to the simple fact of seeing, it is of little consequence how the eye is situated in respect to the head, so that the axis is upon the object looked at; but when the eyeball is very much turned to one side, the muscles which are inserted upon the whole ball, and give it its motions, are strained, and therefore there is less command over the eye, less power in it as a measuring instrument; and it examines an object in detail with more difficulty than when it is in a forward position.

The natural desire which we have to examine an object makes us bring the axis of the eye to bear upon it; and, as the ball is turned by the muscles, and not by any power in itself, the desire really addresses itself, not to the power of vision in the eye, but to the muscular feeling. The inner coat of the eye assists, however, in this process; for that impatience of light, which becomes stronger as the light is

more oblique and the vision less perfect, moves the oblique part away from the light, or, in other words, it tends to move the centre of the eye into the centre of the light.

The double provision which there naturally is for the motion of the axis of the eye, and the celerity with which that motion is in consequence made, show that this is a very important part of our economy, and it is one which can be very much cultivated by practice. A person little accustomed to reading takes a considerable time to read one page of a book, so long, indeed, that he is not able to carry the meaning with him from beginning to end, though he may perfectly understand every individual word, phrase, and sentence; but one who has been much accustomed to reading can run over a page while he draws his finger, at a moderate rate, from top to bottom; and the chance—nay, the certainty—is, that if he can run over a book skilfully in this way, he shall lay it down with a much clearer and more useful knowledge of its scope and contents than if he read it word by word, and weighed the merits of it sentence by sentence. We grant that this is not the way to study a book, but it is the way to find out whether a book is worth studying; and this is a matter of considerable importance, except in the case of books of amusement, which we read only for the sake of the story, and of which the interest would be lost if the story were known beforehand.

The same advantage is obtained by glancing over a landscape, or any subject consisting of many parts;

and a person who is accustomed to this kind of observation can see more, enjoy more, and learn more, in one hour, than one who drudges on from detail to detail can do in a week. This process may be called generalization by the eye; and the eye is the only organ of sense which can generalize rapidly, and with proper effect. The fact is, that it is this quickness in the eye which forms the essence of what is called a habit of observation; and no one who has not seen the effects could be aware of the vast superiority that it gives, and the very little trouble with which it may be acquired. It is not trouble at all, indeed; for the great power which the very first essay of it proves to have been acquired, makes pleasure of all the future practice.

Thus, in judging of relations or comparisons, in which there is both a muscular feeling and a mental process, the ready use of the eye is of far more value to us than that of any other organ; and in this way the eye can do far more for its owner than that owner can show to others. Virtually, it can divide space without limit, though we cannot mark the spaces so divided beyond a certain measure, and that depends on the keenness of the eye and the nature of the substances used. If the eye is very fine, and the markings also, less than the hundredth part of an inch can be marked off. This, it is true, is nothing to what the hand can do, because the real pencil or style which the eye carries—namely, its axis of vision—cannot make any mark, and the hand is called in as recorder; but the actual division which the eye can make, by

means of its axis, is far more minute than even the two thousand five hundred parts into which the hand can divide a single inch. The hand and the eye are the only organs which we ever employ in extending our knowledge of the material world; and in range, in rapidity, and in accuracy, without some actual application of a standard, the eye is certainly the superior of the two. Both of them work by means of the same measuring instrument—namely, the muscular feeling; and both require a mental reference before that which they are the means of acquiring can amount to knowledge; but in the use of its muscular measure, the eye is both more ready than the hand and more accurate. The eye can glance over every letter in a page before the finger can be pointed individually to each letter in two or three lines. There is one advantage in the muscles of the eye: the extent of motion—the space which the axis of vision travels over, is told upon single lengths of muscles, without the intervention of any bones and joints. Thus, the sense of the motion is obtained at once; but in moving the finger, if it is over any considerable distance, the hand, the fore-arm, the arm, and even the body, may come into play; and as there are a great many muscles at work in this, we would hardly reduce them to calculation, and the mind can give a very inadequate estimate of them. Then the process is so much slower in comparison than that by the eye, that time enters into the estimate; and we are very apt to judge of the space passed over from the time, without reference to the muscular exertion, which is the real measure.

Thus, when we do not see them at the same time, or do not see them at all, we have very different notions of the lengths of two equal rods, along which we pass the hand slowly in the case of the one and quickly in the case of the other, with the eyes shut both times.

The advantages which we derive from the diminished visual sensibility of the retina as we recede from the centre of it, in respect of clearness of vision, is a very important matter, both in enabling us to fix our attention upon any particular object in the field of our view, and for enabling us to see objects at all in certain positions of the light in which we view them. In the common use of our eyes, in daylight or an illuminated apartment, we generally have two lights to deal with, the one of which shows us the object at which we look, and the other prevents us from seeing that object. We see all objects which are not luminous by means of reflected light; and luminous objects, if they are brilliant, are less definite to the sight than objects which give no light of their own: the disc of the unclouded sun is much less definite to our view than the disc of the unclouded moon, and the light of a lamp is neither so bright nor seen so far, as the reflection of the sun from a window-pane.

If a painting is varnished, or a print framed and glazed, there are two separate lights given out by the surface: one from the varnish or the glass, which is the entire light reflected without any distinction of colors, or lights and shadows; and the other, which shows the colors, because each colored portion absorbs all the light except that portion which forms

its own color. The first of these lights is reflected from the picture at the same angle at which it falls upon it, only it is reflected the other way; and if the light is strong and falls obliquely, and we stand in the way that it comes off in reflection, we see nothing but a shining surface; but if we shift out of this position, so as to get more directly in front of the picture, we see the colors. The light from these is sent off in many directions, though in some better than in others; and thus a picture does not appear quite the same when seen in different lights, either in respect of their intensity or of the direction in which they come. These are partial matters, however.

But when we are abroad in the sun, or where there is a strong light, and especially where there are two strong cross lights, our vision is a little disturbed as it is, and would be vastly more so if it were not for the diminished sensibility of the retina as we recede from the centre. The light of the sun which comes to us directly, comes fully to us, while the objects which we see by means of that light reflect only a portion of it. Thus, if they were to affect the retina equally, the stronger would in a great measure hide the weaker, and the light of the sun would, so to speak, put out the other one. Constructed as our eyes are in the manner most advantageous for seeing in this light, we feel not only great difficulty in getting distinct vision, but great pain in the eyes, when the objects we wish to look at are near the bright sun in position. When the sun has just risen in a clear morning, the objects in the eastern horizon are very

indistinct; and those in the western horizon are equally indistinct when the sun is near setting. At mid-day with a clear sun, the objects in the south are most obscure, though being in shadow they make a contrast with the sky. Those in the east and the west are most characteristic in their masses, or have the boldest relief, as they have all the advantages of light and shade; but those in the north have their details best made out, and their colors most perfect. Some attention to these effects of different positions of the direct and reflected light are of much use, in giving that effect of light and shade to scenery which harmonizes best with the character of the subjects and also to those who wish to derive the greatest, pleasure from the use of their eyes in viewing the country—an occupation fraught with much more health and pleasure, and instruction, than many are aware of. If you would see the grandeur of some stately tower, or other large and opaque object, get it between you and the sun, and approach it near enough to be in its shadow; if you would judge of the finest effect of an ornamental tree or shrub, view it across the sun; and if you would find out the delicate beauties of a flower, or inspect any other minute object to the most advantage, turn your back to the sun, and let it be in your shadow. The education of the eye in these matters is a delightful task, but it is one of those in which one hint is better than fifty teachers.

The cases in which the two lights interfere, and

one of them weakens the other, are very numerous. If a candle is placed in the window, those without cannot see what goes on in the room nearly so well as if the candle were against the opposite wall, because the direct light from the candle is more powerful than the reflected light from the objects in the room. It is upon the same principle that, when a reader's eyes begin to fail, he holds the book on the other side of the candle, and places it so that the direct light of the candle does not fall upon his eyes; and it is upon the same principle still, that a shade over the lamp or candle is so advantageous both for clearness of sight and for saving of the eyes. What is going on inside a house in daylight is never so well seen by those who are without, as what is going on without is seen by those within, because of the diminished light that comes out; and after a certain obliquity to the plane of the window one cannot see into the room at all.

Objects in the direction over which the sun is at mid-day, are less distinctly seen in winter than in summer, because the light of the sun is more nearly in the direction of the eye; and the nearer the equator the place is, the sunward view at mid-day is the more distinct. When the sun is in the zenith, the mid-day view is clear, and equally clear in all directions. Hence, when a large apartment is lighted by one brilliant chandelier placed high in the centre, the light is far more pleasant, and the contents of the room are more generally and more clearly seen, than by any number of lights placed nearly on the same level with

the eye. Hence, also, the great advantage of a light from the top, especially in the studios of artists, and in picture galleries and collections of statues.

If the direct light comes exactly in the same direction as the reflected light by which an object can be seen, there is no construction of eye that can render the object distinct; but there are not very many instances in which we are reduced to this, the least favorable use of our organs of sight. If the direct light is a strong one and the reflected very weak, as in the case of a partial eclipse of the sun, where we have the full light of the sun from the uneclipsed part, and only the reflection of the earth upon the moon, a shade of colored or smoked glass, or even a handkerchief of fine texture put on the eyes, folded as many times as may be necessary, takes off the glare of the sun, and enables us to get a clearer view of the whole phenomenon.

Had the retina been equally sentient through a large portion of its extent, we should have had very little use of our eyes in bright sunny days, because so many side lights would have come in upon us, all equally strong with the light from the object which we wish to see, that we should never have been able to get a clear view of that object. Various nocturnal animals, and owls in an especial manner, appear to have the active part of the retina much more extended than it is in Man. This is obviously necessary, because the fainter light by which they have to seek their prey requires a larger field on which to produce its effect. But when these animals are forced to

come abroad in clear sunshine, they are so bewildered by the cross lights that they are unable to see their way, and thus they may be taken by the hand. If the day is very dark, however, they see better; and the larger owls of the higher latitudes seek for prey the whole day long, when the air is darkened by thick clouds or snow storms. A total eclipse of the sun will also send the day-birds to their perches, and bring out the owls.

Such are a few particulars, relative to the functions, uses, and in part the culture of the eye,—the most beautiful, and in some respects the most interesting of all the organs of sense, and one which might be far better cultivated, and turned to much more pleasurable and profitable account than it is with most of us. A cultivated and industrious eye is certainly, next to good health, the most valuable of all our physical enjoyments. It is the one which makes the nearest approach to mind itself in the range and rapidity of its power. Twenty or thirty miles is the utmost extent at which the ear can catch even the loudest sound with which we are acquainted, and to do this the circumstances must be peculiarly favorable. Then the din which comes thus murmured from afar is really nothing in signification; for we can tell nothing about what occasions it, and it is only under particular circumstances that we can tell the direction in which it comes. The eye can see at the distance of more miles than the ear can hear at hairbreadths, and it can be the means of guiding us to accurate knowledge, at distances greater in the same propor-

tion than those at which the ear can give us any knowledge; and, in its own peculiar department, it can accomplish more in an hour than the hand can in a month. It touches so nearly upon intellect, however, and holds intercourse so directly with that, that the consideration of it must be partially renewed in the volume on "Intellectual Man."

The senses of smelling and tasting can scarcely be said to come within the denomination of senses of perception, or at all events of senses of information, as the sensations which they communicate are simply those of pleasure or pain, and not of a nature upon which any thing like information can be founded. They sympathize with each other, but they sympathize little with any of the other senses, and, one may say, nothing at all with muscular feeling, which may be regarded as the grand means of connexion and intercourse between the sensations of the body and the perceptions of the mind. They are thus the most exclusively animal of all our senses, and admit of very little in the way of cultivation;—although, to those who have their enjoyment more in and for the body than in the higher pursuits which become the dignity of beings endowed with the means of acquiring knowledge without limit, and being happy in the exercise and enjoyment of that knowledge for ages without end, they form not a little of the occupation and the enjoyment of life. The freshness of nature is delightful, and that wholesome food should be grateful is an indication of a healthy state of the system, and a pledge of its continuance; but they who have to stifle

their own effluvia in artificial odors, and spur their jaded palates by meretricious dainties, are more deserving of our pity than worthy of our imitation.

The ear is an organ of a different character, and the sense of hearing, of which it is the seat, is the inlet of much knowledge, and the source of some of the most exquisite pleasures of our existence. The ear has not the same direct communication with the muscular sense as the eye or the hand; but still the sympathy between them is not less complete, if indeed it is not, in some respects, more so. In the ear, as in the eye, there is a double function, one having reference to the external world, and the other to the body. The first of these is the proper function of the ear, and the other belongs to it in common with all parts of the body that have feeling of any kind—and, if we except the salts of lime in the bones, there is probably no part which has not some kind of feeling, whether we are acquainted with it, or have even the remotest consciousness of it in our own case. A very serious injury cannot be done to any part of the body which is in itself sentient, without a communication to all the other parts, and in the case of the localised senses, each sense receives its information in its own particular way. A violent injury done to the head, if such as not to put an end to all sensation, tells as lightning to the eyes, and as thunder to the ears. Sir Charles Bell mentions that, in the case of an officer, through the bones of whose face a musket-ball had passed, "he felt as if there had been a flash of lightning, accompanied with a sound like the shut-

ting of the door of St. Paul's." The flash to the eyes is instantly over, but the sound in the ears is more prolonged; and accordingly we find, that when the head is struck severely and unexpectedly against any obstacle, the party generally puts the hands to the ears before knowing what really has happened.

It would be to no purpose that we should minutely describe the parts of the ear; for the most skilful anatomist by whom those parts ever were demonstrated, can no more tell us that the ear is so constructed as that it must hear, than the man who knows no more of its structure than can be seen by that casual glance which we throw upon things perfectly indifferent to us. We may indeed inform ourselves that there is an opening which leads to very intricate cavities in the bone, and that we come at last to a fluid in which filaments connected with what we call the auditory nerve are bathed; and we call this the especial organ of hearing. But we cannot tell what particular, either in the form or the substance, makes it so, or even that it is so. The nerve itself, of which these filaments appear to be prolongations, does not hear; and though the dividing of it destroys the sense of hearing, we have no right to say that the nerve conveys the faculty of this sensation from the brain to the filaments, or the sensation itself from the filaments to the brain. Air, light, heat, and humidity, and probably many other matters which we do not know, are necessary before a plant can expand a flower, and prepare and fertilise and ripen seeds; but we cannot take upon us to say that all these could of themselves pro-

duce the seed of a plant: *that* is specific, and must either be of the plant itself, or not at all. It is the same with the organ of hearing. It is a specific part of the animal organization, varied so as to be in all cases the best fitted for the purposes of the animal; and it must derive its nourishment from other parts, because there is in the animal a special system for the nourishment of the whole, and according as any part requires a different kind of supply from the arterial blood which is distributed over the whole body, organs of secretion are always produced for the purpose. But no matter, of what kind soever it be, can be elaborated into a sensation, for a sensation is not matter; and surely it would be absurd to say that matter could, by the action of any material apparatus—be that apparatus what it might, be changed into that which is not matter. That the nerve does supply the peculiar organ of hearing with something which is essential to the faculty of hearing is certain, because the faculty ceases when the nerve is destroyed; but that it supplies it with the faculty, or conveys that faculty or the exercise of it in one way or another, is a mere assertion, which is not only without proof, but contrary to all probability—as absurd as if one were to assert that the only way to become an adept in Greek is to live in indolent seclusion, and drink copiously of port wine.

It is the same in the case of every other sense, whether more local or more diffused, and whether in Man or in any other animal. We cannot tell whence it arises or how it acts; and though, by the indirect

process of destroying certain parts of the organization, or seeing them as naturally destroyed, we come to the conclusion that the organ with whose destruction the sense ceases is the seat of the sense, yet we have no absolute certainty upon even this point. Thus, when we examine the subject of sensation, calmly and without prejudice or hypothesis one way or another, we find that we are in exactly the same predicament with regard to it, as with regard to the subject of mind. Certain impressions are made upon certain organs of our bodies, which are not made upon any other parts; we call the faculty of receiving the impression a sense, and we call the part to which we trace it the organ of that sense; and if we find a similar organ in another individual, whether of our own species or of any other we immediately conclude, upon the general principle which guides us in all our reasonings, that the same organ is endowed with similar sensation in that individual. If we find that the use made of the organ is not the same, then we examine in order to ascertain what difference there is in the organ, or if we find a difference in the organ, we examine in order to ascertain with what difference in the application it is attended, and, by proceeding in this manner, we have arrived at whatever knowledge of the animal creation we possess. But we cannot prove the locality or even the existence of any of these senses in any other way than by these effects. So that sensation is in reality a matter of belief—and the very fact of our existence, when we examine it narrowly, is traceable to the very same foundation and to no other.

The case of the mind is nothing different in principle, only we can refer the mind to no particular organ, neither can we say that the whole body regarded in its combination is the organ of the mind in the same way that we may call it the common organ of the senses, in their sympathies and combined actions. The senses themselves are the organs of the mind, if indeed we can call them organs; and those senses are not, as we have seen, material, nor can they be *originated* or produced by any combination or process of mere matter. Mind is a step further than this from any thing that matter can produce from its mere properties as matter.

Hearing is one of the senses by which the human body is specially fitted for its connexion with the mind, and though, in proportion as the mind is more exercised in knowing, judging, and planning, all the senses acquire more of an intellectual character, yet hearing is especially the intellectual sense, even more so than vision, valuable as that sense is in its nature, and extensive as it is in its range, after it has once been cultivated. As is the case with vision, so with hearing, there are many animals which have the mere sensation more acute than it is in Man; but there appear to be no others in which the ear can become an inlet of general knowledge.

That the senses of animals are susceptible of a peculiar kind of cultivation, no one can deny; and it will also be readily granted that this may be accomplished either by human training or by the animals themselves. Plants are susceptible of cultivation, for

they obey the hand of the grower, and they adapt themselves to situations and circumstances without any human assistance; and it would be strange indeed if the animals had not similar power. Animals have senses; the muscular sense is excited by the senses of observation and feeling, and muscular action follows the excitement in them as well as in Man. The grand difference is, that in them this constitutes the whole process; they have no occupation but animal action, and no stimulus to this action but their senses; while Man has an internal train of operations, by which he can plan whatever he wishes to plan, and put that plan into execution, or desist from it, without any immediate stimulus from the senses of the body. By this means the process of education in Man can go on independently of the objects of sense, and Man can know a great deal more than he ever had any bodily experience of.

Dogs, for instance, may be very clever animals in all matters that come under their sensal observation; but no dog can know what dogs were doing in the days of Julius Cæsar, or what they are now doing in China. If they knew this last, there would, in all probability, be a canine crusade against the Celestial Empire for the horrid practice of eating dogs, to which the inhabitants of that empire are so much addicted. This is at least one instance of the fundamental distinction, and we find one of the strongest physical proofs of it in considering the connexion of the ear, or the sense of hearing.

We have already observed that there is no obvious

physical measure in the ear, at all answering to that which the eye employs when its axis travels over the length of a line or any dimension of an object: but, on the other hand, there is no immediate connexion between the eye and the organs of voice; while between the ear and those organs there is one of the strongest connexions which can be found in the whole physical system of Man.

The organs of voice are so very different in Man from the organs of noise in the other mammalia, that the *capacity* for voice in him almost merits the name of a peculiar sense. We have no satisfactory evidence of what sounds those organs would pronounce, if the party had no example to learn by; but we do know that those who are born deaf have naturally no voice, however perfect their organs may be; and when they are taught to articulate, their sounds are hollow, monotonous, and destitute of expression. Sounds which reach the ear from the organs of voice, or from the mouth generally,—for the whole mouth is concerned in the process of speech,—are better heard and more sonorous than those that enter by the external ears This is at once proved by a well-known and simple experiment. Fasten a bit of string to the top of the poker; take the end of the string between the teeth, and swing the poker so that it shall strike gentle blows against the fender. If the ears are left open, the blows will tell only as a tinkling noise; but if they are closely shut, the sound of the blows will be as sonorous as the tolling of a bell, and far from disagreeable. When a rustic listens to a marvellous tale, he does not

turn his ear to the teller, but faces him open-mouthed, as if he were swallowing the sounds. Other instances will suggest themselves to any one who chooses to attend to the subject.

Now this remarkable sympathy between the organs of hearing and the organs of speech not only points out that it must have a purpose, but it points out what that purpose is. Man not only hears the voices of his fellow men, by means of the outward ears, in the same manner as he hears other sounds; but he has an inward and more perfect hearing of his own voice, directly through the connexion between the mouth and the ears. It is certain that this inward hearing is always simultaneous with the utterance of speech; and it is highly probable that, in all cases in which the words are spoken with earnestness and feeling, the ear takes the lead, and the feeling thereby suggested so modulates and tunes the noise, that the character of the sounds carries the passion which the speaker feels or wishes to express home to the feelings of the hearers; and carries it with so much power that they whom no reasoning would convince, are carried captive by mere sound. This is greatly the case among men in a rude state of society; and an impassioned speaker, who tunes his voice to the feelings, captivates our attention, even although we understand not a word of the language in which he speaks. The expression of the face and the gestures of the body no doubt contribute largely to the whole effect; but we are strongly affected by the sounds alone, when the

speaker is concealed, as well as the language unknown.

In those who address popular audiences, we have very remarkable instances of this. The speaker who leads the crowd as he lists is never the man who addresses himself most closely to their understandings, or who himself has the clearest perceptions and the most correct and useful views on the subject. He is very often a man of little knowledge and less principle; and these are among the most successful qualifications that he can have. Men led by the understanding go advisedly and in their own strength: but they who are taken by the ears are borne whithersoever he who succeeds in taking them lists. Even in those assemblies which are understood to be the most armed against those weapons which assail and overcome the vulgar, we find instances, and striking instances, of this influence of mere sound. The speech which calls forth applause at the close of every section or sentence, and which rounds its peroration amid "loud and long-continued cheering," is often sorry stuff when it appears in print, corrected by the author; and would be quite unintelligible if set down verbatim.

Still, there is no question that this sympathy between hearing and voice is in itself a most valuable gift, and that it is one of the special adaptations of the physical man for his higher character and office as an intellectual being; and the want of this sympathy, and the unfitness of the mouth in the other mammalia for being an organ of voice, is a proof that they are not fitted for mental endowment, and consequently

that they do not possess it. Animals do indeed express their appetites by sounds as well as by gestures and actions, and when their nature is such that they associate in large or small numbers, or for longer or shorter times, they have particular cries by means of which they call and answer to each other: but we do not suppose that there is any one capable of reflecting upon the subject who will venture to say that any one sound uttered by an animal is expressive of a single shade of meaning beyond the expression of the momentary passion of the animal uttering it.

Language is wholly intellectual in its origin, and where there is no intellect it would be a useless gift to a creature that had no mind, but in which the present sensation is all that is needed for the supply of the present want. The absent, the past, and the future, are the only subjects for which language is necessary; and these are the province of the mind, not of the senses. No doubt we speak about present phenomena, occurrences, and objects; but any one who chooses to attend to the manner in which we speak of them, will invariably find that they are spoken of in reference to past experience, or future anticipation.

Thus we find that Man, considered only in his physical nature, is a being altogether out of place: that there is no locality on the earth for which he is specially formed, no habit analogous to those of the other animals for which he is specially fitted; and that, if he were to live as they live, the best and most interesting part of his physical organization would be worse than useless, that his means of strength would

be weakness, and the powers by which he is enabled to subdue the world would be his own destruction. Therefore, in order to understand Man in his real position in the world, we must study him as Intellectual,—in order to know ourselves aright, we must know the nature and the phenomena of our minds.

THE END.

OTIS, BROADERS, & CO.

HAVE IN PRESS—FOUR VOLUMES ON

"MAN."

By ROBERT MUDIE,

Author of 'The Four Seasons,' 'The Heavens,' &c. &c.

The general scope of these Volumes will be to point out, in plain and popular language, and with appropriate Illustrations, the knowledge which every man ought to have of himself, and the means which he ought to adopt in applying this knowledge to the attainment of the greatest good both of himself and of society. These volumes will present, in small compass, some of the important subjects that can engage the attention of human beings; and in treating of them, established opinions will neither be wantonly attacked nor blindly followed. To choose the good and reject the bad, will be the object throughout, on whichever side the one or the other may be found. The four will be continuous; but each complete in itself.

I. PHYSICAL MAN.

Self-knowledge generally, and the knowledge, Education, and Use of the Powers of Observation and Action.

II. INTELLECTUAL MAN.

Knowing, Reasoning, and Contriving, with their Improvement and Use.

III. MORAL MAN.

Desires and Motives, their Nature and Regulation, as affecting Private Conduct.

IV. SOCIAL MAN.

Duties of Man to Society, and of Society to Man—Public Institutions, Systems, and Measures.